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ART. 53.—*The Vine Dresser's Theoretical and Practical Manuel, or the art of Cultivating the Vine; and making Wine, Brandy, and Vinegar.* By THIEBAUT DE BERNEAUD; from the second French Edition. New-York, 1829, published by P. Canfield. 8 vo. p. 158.

The author of this work is perpetual secretary of the Linnæan Society of Paris, member of several associations for the improvement of agriculture, and editor of the Agricultural Journal of Paris. In addition to being thus situated, at the fountain head of information on the vine, Mr. De Berneaud appears to have travelled and become familiar with the various modes of culture, not only in his own, but in other wine countries. The translation is by a lady of this city, who is favorably known in the reading circles, as the translator of other works. Having said thus much of the author, we will endeavour to interest our readers, and give a correct impression of the work, by condensing as much of the contents as our limits will permit.

The history of the Vine is of great antiquity. It was first disseminated by the Ethiopic colonies. From them it passed to the Arabians into Judea, thence into Greece, Spain and Italy. Its introduction into France, or Gaul, is attributed, by the most accredited Latin writers, to the enterchanges of commerce. In A. D. 92, so generally was it cultivated in almost every part of France, that the government of Rome, from jealousy, but under the pretence of preventing the recurrence of a famine, decreed that the vineyards should be converted into wheat fields. This decree was rigorously executed, and kept in force for two centuries. In A. D. 282 the cultivation of the vine was restored, and continued to progress by a more general culture, and by the introduction of new and valuable varieties from the east, until 1556, when, under an impression that it drew attention from tillage, a new proscription commenced. The roots of the vines were torn up, and the embowering verdure of the hills destroyed. Eleven years after the law was revoked: since that period to the present, with some occasional light restrictions, the grape has flourished.

The species and varieties of the Vine are numerous; and their names, in many instances, obscure and empirical. Various names are often given to the same variety; and often one variety is so much improved or deteriorated by different modes of cultivation, soil and exposures, that it cannot be known by the name. Much has been done in France to obtain a regular nomenclature, and much remains to be done. De Berneaud gives a description of 17 species, embracing those most valuable for the table, and for wine.

Soils and exposures. The climate suitable for the grape is generally found between the 35th and 51st degrees of latitude. In the North, the vine spends itself in vigorous vegetation, not sufficiently ripening the grape; in the South it has to encounter a long continued withering heat. The qualities of the fruit degenerate by watering the plant. In southern regions an eastern exposure should generally be preferred; in northern ones, the vineyard should face the south.

The vine flourishes in almost every variety of soils, which are not soaked with stagnant waters. The most suitable, however, is a dry, light, sandy soil. The wines of Tokay are the produce of vine yards, covered with large calcarious pebbles, and lying on the highest flanks and ridges of a promontory exposed to the north and west. The more dry, arid, light, and unfit for other crops is the calcarious soil, the better is it for the vine. Soils composed of disintegrated granite, reduced to friable sand, give to wines a fine color, a peculiar zest and spirit, and an aromatic flavour very agreeable. All light earths, that are porous, fine and friable, retaining water neither on the surface nor on the immediate substrata, are congenial. Although the Latin proverb, *Bacchus amat colles*, is generally true, still there are numerous instances of vineyards on plains producing excellent wine. Grounds rising by a gradual ascent and not surrounded by dense woodlands, are desirable situations; the very summits of hills and ridges, on the whole, are unfavourable. The skirts of hills, where the slopes gradually swell from a plain, are the true situations for the vine. The direct action of the sun is essential to mature the high qualities of the grape. The shade of trees is injurious, the least hurtful, however, are the peach, almond and olive.

Culture of the vine.—The author gives four principal modes of training. The Tall-stock or Running vine is supported on trees and palissades, after the manner of the ancient Romans. To this method there are many objections. The clusters are not sufficiently exposed to the sun, and too much to the chilling in-

fluence of winds. The difficulty of pruning is also an objection. Where there are heavy dews rendering the fruit liable to mildew, this method answers tolerably well.

The Low Stock training is derived from the Grecians, and is considered the most natural and advantageous. The Counter-espalier, the Pyramid, and the Trellise training are all in vogue, and have their peculiar advantages.

Selection and setting out of Slips.—A vineyard should not be composed of more than five or six sorts, and these selected with great care. Great bearers are not supposed to produce the best wine. Early kinds should be planted in the higher part of the vineyard. By setting out the slips in the fall, a year is gained, and often, it is said, two.

A vineyard from cuttings lives the longest, and is most fruitful; one from scions yields sooner. Very old stocks bear no suitable wood for cuttings, which should be taken from vines of seven or eight years old. The vigor of vines is promoted by frequent tillage; weeds and most grasses are injurious.

Tillage.—Ploughs, hoes, pick-axes, dibbles, and large rakes, are the implements used in France. In the first years of the plantation, the ground should be frequently stirred. When the vineyard has reached its full bearing state, two or three dressings with the plough and spade in a year, are usually sufficient for the health of the vine, and to suppress the weeds.

Manure.—Stable-yard litter is considered injurious to the flavour of the wine. But when used as a compost, with mould, lime, ashes, and dead leaves, its effects are beneficial. The manure from horses, sheep and hogs suit a hard stiff soil; that of horned cattle, and fouls gives coherence to light soils. Hair, feathers, horn shavings, and other substances that decompose slowly, are useful. The cleanings of ditches, running streams, and yards, make a good manure, when used with moderation. Green crops ploughed in are in high repute. Lupin and buckwheat are recommended for this purpose. The clippings and the leaves of the vine, buried around the stock, soon decompose and promote the health of the vine, without injuring the flavour of the grape. The musk of the grape, combined with dung from the pigeon house and hog stye, is often used, and with much benefit.

Many other topics are treated on in this interesting work. Indeed it appears to be, as far as we are qualified to judge, a full and complete manual on the cultivation of the vine and the manufacturing of wine. Those who take an interest in the success of the grape on this side of the Atlantic, should not fail in giving it a perusal.

ART. 54.—*On the Cultivation of Hemp.*

[From the New England Farmer.]

MR. J. B. RUSSELL.—I embrace the first moment of leisure, to give you, in compliance with your request, an account of the method pursued by our farmers, in the cultivation of hemp. It has been raised in my neighbourhood for more than twenty years. It is considered as a sure crop; and at the prices which it has borne for a few years past, affords a reasonable remuneration to the cultivator. In the account which I shall give, there will probably be nothing new or instructive to those already acquainted with the process. If you think it will be useful to others, you will make such use of it as you think proper.

Hemp requires a deep and rich soil. Any attempt to raise it upon a light soil, or upon land worn out and exhausted, until it is recruited by manure, and a fertilizing course of husbandry, will result only in disappointment. Nor can it long be continued upon the same piece of ground, without an annual supply of manure. But upon a good soil, with an annual sprinkling of manure, at the rate of eight or ten loads to the acre, it may be continued for a succession of years, without any material diminution in the value of the crop.

The ground must be prepared for the seed, much in the same manner as for flax. It must be ploughed and harrowed sufficiently to break the clods, and to render the soil fine and mellow. As different soils require different degrees of labour to produce this effect, it must be left to the judgment of the cultivator to determine when his ground is in a proper state to receive the seed. I can safely say, that few farmers err, in ploughing and harrowing too much.

The time for sowing is about the 10th of May. A few days earlier or later will make no difference. It must not be so early as to expose the tender plant to *severe* frosts, and if sown late in May, it will produce a light crop—the stalks will have a thin coat.

The quantity of seed varies with the strength and condition of the ground. Two bushels is the usual quantity sown upon an acre—and this is generally sufficient. Some have used more, and upon very strong land have gone as high as three bushels. But I believe that few of our farmers have found their account in using a greater quantity than that first named. When it exceeds that quantity, the land must not only be strong, but it must be reduced to a very fine tilth. Otherwise, when it comes to grow, there will be a great deal of *under-brush*; that is, short, spindling, coatless stalks, of no value, and which will only be in the way, at the time of pulling. The seed is sown broad cast, and bushed or harrowed in, like flax.

No further attention to the crop is required until the season of pulling and cutting. Although the lat-

ter mode of gathering is attended with less labour, our farmers almost universally adopt the former, as the most profitable. This commences about the 10th of August. The time of pulling is determined by the appearance of the hemp.—There are two kinds of hemp in every field, distinguished by the names of the male and the female. The latter produces the seed, the former the blossom and the farina. The male hemp has but few and slender branches. When this has turned white, or a pale yellow, has shed its leaves, and the farina has chiefly fallen off, then it is time to pull it. The female hemp has more and stronger branches, and continues fresh and green until the seed is ripe. It is common to leave patches, or narrow strips, where the seed hemp is most abundant, until the seed has ripened, which will be about a month after the time of pulling; in which case, the economical farmer will pull out the male hemp as far as it is practicable; for the fibres of the hemp, that stands in the field until the seed is ripe, are always stiff and harsh, and will bring less in the market, than that which has been pulled at the proper season.

The pulling is a heavy job. One-fourth of an acre is considered as a day's work, though expert hands will pull a third of an acre. No precaution is necessary except to guard against breaking the stalks. The laborer gathers a few stalks in his hands and pulls them up, and having repeated this three or four times, he strikes the roots once or twice with his foot, in order to kick off the dirt, then holding the whole loose in his hands, lets the roots drop on the ground for the purpose of making that end of his handful even. And in spreading his hemp on the ground, he is careful to lay the butts straight and true. This will greatly facilitate the labor of binding.

Rain upon the hemp after it is pulled, produces the same effect as upon mown grass. It discolors it and injures its quality. It must therefore be suffered to lie upon the ground no longer than it is necessary for its preservation. As soon as it is sufficiently dried, which, in warm and drying weather, will be after two days sun, it must be bound up in small bundles or sheaves. A little rye straw is the cheapest and best thing for bands. Let the band be put on towards the top of the bundle, and then shoved down to about the middle, otherwise it will be difficult to bind close enough to hold together, through all the subsequent handlings. Set up 15 or 20 bundles together, well braced at the roots to admit a free circulation of air, and to prevent it from blowing over, and let it remain in this situation, until it is cured sufficiently to put into a stack or under cover. This may be done, in good weather, after two or three days. In the construction of the stack, great pains must be taken, lest the rain should find a passage into it. It is safest to put it under cover, either under sheds about the barn, or by erecting one for the purpose.

It may be asked, why not transport it to the place of rotting and immerse it in the water, immediately after it is pulled, or as soon as it is dry, and save the trouble of securing it from the weather? I am not prepared to say that this cannot be done with safety, under vigilant care and attention. It is believed, however, that it would be exposed to greater hazard of loss, than at a later period. At the time of pulling, the weather is hot, and the water warm. Putrefaction proceeds with great rapidity. If the hemp should remain in the water a little too long, or if, after it is drawn from the water there should be a long rain, or a continuance of damp weather, to prevent its drying, it would be rotted too much, and the fibre would be materially injured, if not destroyed. But when the hemp is immersed later in the season, after the weather and water have become cool, there is no risk in suffering it to remain in the water a short time longer than is necessary. It is also supposed that when the hemp is rotted in hot weather, there will be a greater proportion of tow—and after it is drawn from the water, the bands must be opened and the hemp spread, in order that it may dry quickly. It is also a busy season with the farmer, and he can attend to it at a later period, with less interruption to other branches of husbandry. These are the reasons which have induced our farmers to postpone the rotting till the latter part of October. As I have never tried any experiments in reference to this part of the process, and indeed have had but little experience in the culture of hemp on my own farm, I will not give an opinion whether their reasons are well founded or not. I have not undertaken to point out the *best method*, in relation to any part of the process, but only to describe the course pursued in my own neighborhood.

It has sometimes been made a question whether running or stagnant water was to be preferred. The latter is more generally used in England.—The former has been universally applied here. A place is selected near the margin of some brook or small stream, which will afford a basin in which the hemp can be deposited, and where, by erecting a dam across the stream, the hemp can be covered with water.

In the first place, the dam is built of a sufficient height to secure the requisite supply of water, leaving a gate way in the natural course of the stream, and the top of the gate a little lower than the height of the dam, to let off the surplus water. After the dam is completed, shut the gate and try the dam, in order to ascertain whether it is water tight, and will stand against the pressure produced by raising the pond. If it proves sufficient, then let off the water and put in the hemp. A space of two or three feet should be left between the hemp and the dam, so that

if a leak should de discovered, there may be room to stop it. This precaution may be unnecessary in an old and long tried dam, but should not be omitted in a new one. Put down a layer of hemp, laying the bundles compactly, then a second course on the first, in a transverse direction, and so on successively, until the whole crop is deposited in the bed, or as much as the basin will receive. Weights, consisting of long and heavy timber, or plank, or slabs with stones upon them, must then be laid across the bed to prevent it from floating. Having deposited the hemp and secured it from rising, the gateway may be closed and the water raised upon the hemp. It will be observed that the level of the hemp must be lower than the top of the gateway, so that the whole body may be immersed in water, and continued so, until it is rotted.

The length of time necessary to complete the rotting process depends much on the weather, and the temperature of water. It may be ascertained whether it has lain in the water long enough, by taking out one of the bundles, drying and breaking it. If the seed cracks easily, and the rind, or harl readily separates from the wood, it is sufficiently rotted. So also, if while it lies in the water, the roots will twist off easily. Hemp put into the water the last week in October, will generally require about three weeks. When put in later, I have known it lie seven weeks. If put into stagnant water, soon after it is pulled, five or six days is enough.

When the hemp is rotted, open the gateway and drain off the pond. The hemp must then be removed to a piece of grass land—the bundles laid upon the ground singly, and, after two or three days turned over. When partially dried, it is carried and set up inclining, against a fence, where it remains until it is fit for the brake. It may then be carried to the building or shed where it is to be dressed; or the brake may be carried to the hemp, as is generally the case here, and after it is broken, it is removed to the barn for the finishing process—or if the weather is not too severe, it may dressed where it is broken.

A cheap vehicle or sled, for the removal of the hemp from the pond, may be made of two pieces of slit work, about 9 feet in length, with three cross beams of the same material. The stakes, driven closely through each beam and runner, will serve the double purposes of holding the sled together, and keeping the hemp from falling off.—No tongue will be necessary. It may be drawn with chains. If however the grass ground is at any considerable distance from the pond, wheels may be necessary.

In dressing, two brakes are used. The first, coarser than a common flax brake, the second, as fine as a flax brake at the head, with one additional bar in each jaw. If the hemp is well rotted and faithfully broke, but little remains for the swingling board. A man, accustomed to the business, will brake and dress from 50 to 75 lbs. a day.

The labor required to prepare a crop of hemp for market, is not inconsiderable. But it will be observed, that but a small portion of the labor comes at a season, when the farmer is most busily occupied in gathering and securing his other crops. The pulling comes on soon after the hay and grain are secured. The rotting does not commence till after Indian harvest, and the winter grain is sown. The dressing is wholly done in cold weather, when the farmer has little occupation besides that of taking care of his stock and providing fuel. Every considerable farmer who has land suitable for hemp, might raise a few acres, without greatly interfering with his ordinary course of husbandry.

The average crop is six or seven hundred to the acre. I have raised nine or ten—but this was an unusual crop. The land was strong, and in *very fine* tilth. The hemp grew to a great height and was very uniform throughout the piece. The price of hemp in market, has varied, of late years, from $10 to $12,50 a hundred. Scarce any crop of field culture can be put upon the land, which will produce so great a result.

It is common for the farmer to let out his land upon shares. In that case, the usual terms are, that the owner of the land prepares the ground, and furnishes one half the seed. The occupant furnishes the other half of the seed, and performs all the labor, after the seed is harrowed in, and returns to the owner one-half of the seed, and one-half the hemp, prepared for market. In one instance, I have received, for the use of my land, more than forty-five dollars an acre clear profit. The moiety of the seed returned to me, was amply sufficient to pay my part of the seed furnished, and the labor of preparing the ground.

The hemp grown in this neighborhood, when *well dressed*, commands the highest price of the best Russia hemp, and is as readily purchased by the manufacturers of cordage. Our farmers sometimes mistake their own interest, by neglecting to hatchel out the tow, through fear of too much diminishing the the weight. An experiment was made in 1824, by direction of the Commissioners of the Navy, to try its strength in comparison with the Russian. "Two ropes, each 2 1-4 inches in circumference, one made of hemp grown in this town, broke with 3209 lbs. The other made of clean St. Petersburg, broke with 3118 lbs." I mention this fact for the purpose of satisfying the doubting, if any such there are, that our soil and climate are as well adapted to the cultivation of this article, as those of Russia, and that no one need be deterred from entering upon its cultivation,

under any apprehension, that his crop, if rightly managed and well prepared, will be of inferior value.

At a time when the supply of the ordinary products of the farm, exceeds the demand, and consequently the price is so low, as almost to discourage agricultural enterprise, it deserves the consideration of farmers in different parts of the country, whether their interest does not require them to turn a part of their land, and to apply a portion of their labor, to the cultivation of hemp. The annual import from Russia, does not probably fall short of half a million of dollars. This amount might, in a short time, be brought to market, from our own soil. In addition to this, we annually import in duck, and other manufactures of hemp, exclusive of cordage to the amount of more than a million and a half of dollars. These manufactures might be carried on in our own country, as well as those of cotten or woollen goods. The present rate of duty on imported hemp is $45 a ton, which is sufficient to afford adequate protection, to the extent of the demand. If the continuance of this duty should not come within the rule prescribed by our present chief Magistrate, which "requires that the great interest of agriculture, commerce, and manufactures should be equally favored," it may perhaps come within his exception to the rule, of giving "peculiar encouragement to any products of either of them, that may be found essential to our national independence."

I am yours, &c.

SAM. LATHROP.

West Springfield, March 16, 1829.

ART. 55.—*Animal Chemistry; or the Substances which enter into the Composition of the Bodies of Animals.* [From Loudon's Encyclopedia of Agriculture.]

The elementary principles of the animal kingdom have been ascertained with considerable precision; but the binary, ternary, or other compounds which these form, have not been investigated with so much success. As these various ingredients are brought into union in the animal system by the agency of the vital principle, their state of combination may be expected to differ widely from the ordinary results of electric attraction. When such compounds of organization are submitted to analysis, the influence of the vital principle having ceased, the products obtained may be regarded, in many cases, as modifications of the elements of the substance, occasioned by the processes employed, rather than the display of the number or nature of the ingredients, as they existed previous to the analytical operations. Hence the great caution requisite in drawing conclusions regarding the composition of animal bodies.

The elementary substances which are considered as entering into the parts of animals, are carbon, hydrogen, oxygen, azote, phosphorus, sulphur, floric acid, muriatic acid, iodine, potash, soda, aminonia, lime, magnesia, silica, iron, and manganese.

Carbon exists in various states of combination in the fluids as well as the solids of every animal, and has been detected in the form of charcoal in the lungs. When animal substances are exposed to a high temperature in closed vessels, the charcoal which is produced differs considerably from that which is obtained by the same means from vegetables. It is more glossy in appearance, and is incinerated with much greater difficulty.

Hydrogen is universally distributed in the animal kingdom; it occurs as a constituent ingredient of all the fluids, and of many of the solids. It is invariably in a state of combination with charcoal; for, as far as we know, it has never been detected in an uncombined or separate state. It has been found in the human intestines, in the form of carburetted hydrogen.

Oxygen is equally widely distributed with the preceding, in the fluids and solids of all animals. A constant supply of it from the atmosphere is indispensably necessary to the continuation of animal life. It occurs, not only in combination with other bodies, but probably, likewise in a separate state, in the air-bag of fishes, in which it is found, varying in quantity, according to the species, and the depth at which the fishes have been caught. It is common, in union with charcoal, forming *carbonic acid.*

Azotic gas is very widely distributed as a component part of animal substances. It occurs in almost all the fluids, and in those solid parts which have carbon as a base. The almost universal prevalence of this principle in animal substances, constitues one of the most certain marks by which they may be distinguished from vegetables. Azote likewise occurs, in an uncombined state, in the air-bag of some fishes.

Phosphorus. This inflammable body exists, in union with oxygen, in the state of phosphoric acid, in many of the solids and fluids of animals. Its existence, however, in an uncombined state, has not been satisfactorily determined, although there appears a tendency to refer the luminousness of several animals to the slow combustion of this substance. Even phosphoric acid can scarcely be said to exist in a separate state, being found in combination with potash, soda, ammonia, lime, or magnesia.

Sulphur, in combination, exists in considerable abundance in animal substances. It can scarcely be said to occur in a separate state in animals; at least the experiments which may be quoted as encouraging such a supposition, are by no means decisive. United with oxygen, in the form of sulphuric acid, it exists in combination with potash, soda, and lime.

Fluoric acid has been detected in bones and urine, in a state of combination with lime.

Muriatic acid exists in a great number of the animal fluids, in combination with an alkali, as in the ammonia and soda of urine.

Iodine has been detected in sponge.

Potash exists in combination with the sulphuric, muriatic, or phosphoric acids; but it is far from abundant in animal fluids.

Soda is present in all the fluids in various states of combination, and is more abundant than the preceding. It gives to many of the secretions the alkaline property of changing vegetable blues into green. It is found in union with the carbonic, phosphoric, sulphuoric, and muriatic acids.

Ammonia exists in its elements in all the fluids, and many of the solids of animals, and is frequently produced during putrefaction. These elements are likewise found united in the system, and the alkali then appears in union with the various acids, as the phosphoric, muriatic, and lactic.

Lime, of which the hard parts of animals, such as bones and shells, are chiefly composed, is of universal occurrence. It is always in a state of combination, and chiefly with the carbonic or phosphoric acids.

Magnesia occurs sparingly. It has been detected in the bones, blood, and some other substances, but always in small quantity, and chiefly in union with phosphoric acid.

Silica occurs more sparingly than the proceeding. It is found in the hair, urine, and urinary calculi.

Iron has hitherto only been detected in the coloring matter of the blood, in bile, and in milk. Its peculiar state of combination in the blood has given rise to various conjectures; but a satisfactory solution of the question has not yet been obtained. In milk, it appears to be in the state of phosphate.

Manganese, in oxide, has been observed, along with iron, in the ashes of hair.

Such are *the simple substances* which have been detected by chemists in the solids and fluids of animals; but seldom in a free state, and often in such various proportions of combination as renders it extremely difficult to determine their true condition.

The compounds of organization are gelatine, albumen, fibrin, mucus, urea, sugar, oils, and acids.

Gelatine occurs in nearly a pure state in the air-bags of different kinds of fishes, as, for example, isinglass, dissolved in hot water and allowed to cool, forms jelly. When a solution of tannin is dropped into a solution of gelatine, an union takes place, and an insoluble precipitate of a whitish color falls to the bottom. It is on the union of the tannin of the oak bark with the gelatine of the hides, that the process of tanning leather depends. Gelatine exists in abundance in different parts of animals, as bones, muscles, skin, ligaments, membranes, and blood.

Gelatine is extensively used in the arts, under the names of glue and size, on account of its adhesive quality, and to give the requisite stiffness to certain articles of manufacture. In domestic economy, it is likewise employed in the form of jelly, and in the formation of various kinds of soup. What is termed *Portable Soup* is merely jelly which has been dried, having been previously seasoned, according to the taste, with different spices.

Albumen, the white of an egg, exists in great abundance, both in a coagulated and liquid state, in the different parts of animals. Hair, nails, and horn, are composed of it. It appears likewise as a constituent of bone and shells; and there are few of the fluid or soft part of animals, in which it does not exist in abundance; what has hitherto been termed the *Resin of Bile*, is, according to Berzelius, analogous to albumen.

Albumen is extensively used in the arts. When spread thin on any body, it soon dries, and forms a coating of varnish. Its adhesive power is likewise considerable. When rubbed on leather, it increases its suppleness. But its chief use is in clarifying liquors. For this purpose, any substance abounding in albumen, as the white of eggs, or the serum of blood, is mixed with the liquid, and the whole heated to near the boiling point. The albumen coagulates, and falls to the bottom, carrying along with it the impurities which were suspended in the fluid, and which rendered it muddy. If the liquor contains alcohol, the application of heat is unnecessary.

Fibrin exists in the blood, and was formerly called the fibrous part of the blood. It likewise exists in all muscles, forming the essential part or basis of these organs. It exhibits many remarkable varieties, as it appears in the flesh of quadrupeds, birds, and fishes; but has not hitherto been turned to any particular use.

Extractive exists in the muscles of animals, in the blood and in the brain. It communicates the peculiar flavor of meat to soups. In the opinion of Fourcroy, the brown crust of roasted meat consists of it.

The soft parts of animals are constituted of these four substances, which also enter into the composition of the hard parts and of the fluids. They are readily distinguishable from one another. Extractive alone is soluble in alcohol; gelatine is insoluble in cold, but soluble in hot water; albumen is soluble in cold, and insoluble in hot water; the fibrin is equally insoluble in hot and cold water. They are variously mixed or united; and as they consist of some elementary principles, chiefly carbon, hydrogen, oxygen, and azote, it is probably that they are changed, the one into the other, in many cases by the living principle,—a trans-

mutation which the chemist has succeeded in accomplishing, and which may soon be of advantage in the arts. The proportion of carbon appears to be least in gelatine and greatest in fibrin.

Mucus occurs in a liquid state in the animal economy, as a protecting covering to different organs. It necessarily differs in its qualities, according to the purposes it is destined to serve. In the nose it defends the organ of smell from the drying influence of the air,—in the bladder, it protects the interior from the contact of the acid urine,—while it preserves the gall-bladder from the action of alkaline bile. It does not contain any suspended particles like the blood, but is homogeneous. When inspissated, it constitutes, in the opinion of some, the basis of the epidermis, horns, nails, feathers. But the difficulty of obtaining it in a pure state, and the discordant characters assigned to it by different chemists, prevent us from reposing confidence in the accuracy of the analysis of those substances, of which it is considered as forming an essential ingredient.

Urea is a substance obtained by evaporation and trituration from the urine of the mammalia when in a state of health. In the human subject it is less abundant after a meal, and nearly disappears in the disease called diabetes, and in affections of the liver.

Sugar exists in considerable abundance in milk, and in the urine of persons laboring under diabetes. In the latter fluid, it is to be considered as a morbid secretion of the kidneys, occupying the natural situation of the urea. In milk, however, it exists as a constituent principle, and may readily be obtained by the following process; evaporate fresh whey to the consistence of honey, dissolve it in water, clarify with the whites of eggs, and again evaporate to the consistence of syrup. On cooling, white cubical crystals will be obtained, but less sweet than vegetable sugar.

Oils vary greatly as to color, consistence, smell and other characters. They possess, however, in common, the properties of the fixed oils, in being liquid, either naturally or when exposed to a gentle heat, insoluble in water and alcohol, leaving a greasy stain upon paper, and being highly combustible. They are distinguished as spermaceti, ambergrease, fat, and common oils.

Spermaceti constitutes the principal part of the brain of the whale, and is freed from the oil which accompanies it, by draining and squeezing, and afterwards, by the employment of an alkaline lie, which saponifies the remainder. It is then washed in water, cut into thin pieces with a wooden knife, and exposed to the air to dry. It is used in medicine and candle-making.

Ambergrease is found in the intestines of the spermacet whale, and in those only which are in a sickly state. It appears to be the excrement, altered by a long retention in the intestines, and therefore scarcely merits a place among the natural ingredients of the animal system. Upon being voided by the animal, it floats on the surface of the sea, and has been found in various quarters of the globe. It usually contains the beaks of cuttle fish adhering to it. It is employed in small quantities by druggists and perfumers.

Fat consists of two substances, suet and oil. It is usually purified by separating the vessels and membranes which adhere to it, by repeatedly washing with cold water, and afterwards melting it, along with boiling water.

Tallow is the fat of ruminating animals, and is hard and brittle, while the fat of the hog, called *lard* is soft and semifluid. Its uses as an article of food, in the making of candles, hard soap, and ointments, and to diminish friction, are well known.

The properties of oils depend in a great degree on the mode of preparation, with the exception of the odor, which arises from the kind of animal from which the oil has been derived. *Spermaceti oil* is considered as the thinnest of the animal oils, and the fittest for burning in lamps. It is obtained from the spermaceti, by draining and pressure. *Train oil* is procured by melting the blubber, or external layer of fat, found underneath the skin of different kinds of whales and seales. From the process employed, it contains, besides the oil, gelatine, albumen, and other animal matters, which render it thick, dark-colored, and disposed to become rancid. *Fish oil* is sometimes extracted from the entire fish, (as the sprat, pilchard, and herring, when they occur in too great quantities to be salted) by boiling in water, and skimming off the oil, as it appears on the surface. In general, however, the oil is obtained from the livers of fish, in which it is lodged in cells.

The *acids* found in animals consist of various proportions of carbon, hydrogen, oxygen, and azote. Some of them are peculiar to the animal kingdom, and others exist in equal abundance in plants.

The uric or lithic acid, abounds in urine, and appears to be a production of the kidneys. The *lactic acid* is common in the animal fluids. The *amniotic acid* has been found in the uterus of a cow. The *formic acid*, by distilling ants. The *benzoic*, *oxalic*, *acetic*, and *malic* acids, are common both to plants and animals, but occur but seldom in the latter.

These *elementary substances*, by combining in different proportions, exhibit a great variety of separate substances. The earthly salts are likewise abundant; and when they occur in a separate state, they strengthen the albuminous framework, and form the skeleton, giving stability to the body, and acting as levers to the muscles. The alkaline salts occur in the greatest abundance in the secreted fluids.

The *fluids* consist of those juices which are obtained from our food and drink, such as the chyle, and are termed *crude* of the *blood*; or prepared from the crude fluids, and destined to communicate to every part of the body, the nourishment which it requires, and of those fluids which are separated from the blood, in the course of circulation, such as the bile, and termed secreted fluids. These are all contained in appropriate vessels, and are subject to motion and change.

The *solids* are derived from the fluids, and are usually divided into the soft and hard. The soft solids consist chiefly of what is termed animal matter, of combinations of carbon, hydrogen, oxygen, and azote. They consist of fibres, which are usually grouped into faggots; of plates, which, crossing one another in various directions, give rise to cellular structure, or of a uniform pulpy mass.

The fibrous texture may be observed in all the muscles, tendons, and ligaments, and in the bones of many animals, especially before birth. These fibres, however minutely divided, do not appear to be hollow, like those of the vegetable kingdom.

The cellular texture is universally distributed in the form of membranes, which invest every organ, the bundles of fibres in every muscle, and, by forming tubes with the addition of the fibrous texture constitute the containing vessels. The substance gives form to all the different parts, and is that particular portion which is first formed, and which constitutes the frame on and within which the other materials of the system are deposited. It readily expands by the increase of its contents; and, with equal ease, contracts when the distending cause is removed.

The pulpy texture is confined to the brain and nerves, the liver, kidneys, and other secreting organs of the system. Its composition appears to the eye homogeneous, and its form is regulated by its cellular envelope.

The soft solids are alone capable of possessing the faculty of sensation. By their aid, the nervous energy is exerted on the different parts of the body; and, through them, the impressions of external objects are received.

The hard solids consist either of cartilage, which resembles, in its qualities, coagulated albumen; or of bone, formed by various combinations of earthy salts. They are destitute of sensation, and are chiefly employed in defending the system from injury, giving it the requisite stability, and assisting the muscles in the execution of their movements.

The proportion between the solids and fluids is not only remarkably different in different species, but in the same species, in the various stages of growth.

ART. 56.—*Cultivation and Preservation of Live Oak in the Southern States.*

This is one of the most valuable productions of our territory. In hardness, solidity, capacity of resistance and durability, it excels the best white oak. The teak wood of the East Indies, has been much vaunted for its excellence in ship building, but the live oak is preferred, and it has been said that these were the only two kinds of timber in the world fit for building ships of war. So great, however, has been the demand for live oak timber in the United States, and so slow is the vegetation of the tree, that several years since, Michaux, in his work upon the forest trees of North America, predicted its disappearance from the United States within half a century. After that period, he says it may exist, not as a forest tree, but as a shrub, like the *Quercus Ilex* an analagous European species, formerly growing in the southern borders of France, and in Spain, and Italy, but now only met with of an humble and dwarfish size. The tree is said to thrive well when cultivated. The Pensacola Gazette, mentions that the live oak trees, which have been planted in the vicinity of gentlemen's seats in Georgia and South Carolina, or have been suffered to remain in the fields, are much more beautiful than those found in the forests.—Some noble avenues of these trees have been formed on the sea coast in those states. Those of Col. Tatnall are mentioned, for which large sums have been offered, but were refused by the proprietor, who would not consent that the trees planted by his ancestor should be cut down.

The difficulty of procuring live oak timber, which has now became so great, that it is difficult to procure enough for the frame of one of our smallest ships of war without enormous expense, has led our government to take measures for its cultivation and preservation.—The plan recommended and adopted for this object, and the mode in which it has been carried into execution, are described in the following article from the Pensacola Gazette.

[*N. Y. Evening Post.*

"We have made some enquiries respecting the cultivation of live oak on Deer Point, opposite this Town. The lands purchased from General Call, Judge Brackenridge, Col. Fenwick. and Col. White, together with those reserved by government, constitute a body of twenty or thirty thousand acres, bounded by Yellow water. Bay on one side, and the Sound of St. Rosa on the other. The land immediately at the point, about four thousand acres, is all live oak hammock, with a border of a thrifty young growth along the water, from one to three hundred yards wide. But the interior, although well set with oak, is shrubby, having been subjected to repeated fires from the pine woods. Yet from the similarity

of the soil and general growth, there is little doubt, that it is as well adapted to the purpose as the border. This border or selvage is about ten miles in circuit, and besides the young growth, contains a number of large trees, fit for immediate use. Much of this valuable timber has been cut away at former periods for the construction of vessels; in the year 1804, a Spanish forty four, the Panzacolenea was built at Navy Cove, from the timber procured at the Point.

We are informed Judge Brackenridge was requested to suggest to the Government a plan for the management of the tract of land reserved, and for the preservation of the live oak generally. That gentleman accordingly communicated one, which was approved, and ordered to be carried into execution. The outline was as follows:

1. To clear away all the foreign growth from among the young and thrifty live oaks, so as to give them the entire possession of the ground, to prune them of all dead limbs, and give them sufficient space to expand.

2. To cut down the large full grown trees, fit for use, and secure the timber under sheds at the Navy Yard; and those likely still to improve, to be cleared and pruned.

3. To make experiments of planting out the young trees, in the open grassy pine woods adjoining the hammock, in places suited to the purpose making roads around them to keep off the fires.

About two months ago, the Judge received instructions to appoint an overseer, to hire twenty hands for one year, and to commence operations according to the foregoing plan. He accordingly commences immediately, and the work under the direction of Mr. Davis has been carried on with the most flattering success.

The trees cleared out already form beautiful groves, and are as carefully pruned as those of an orchard. They are divided into four classes—beginning with the youngest, which are under two inches in diameter, and are called nursery trees—the second class, are between two and six inches in diameter, and generally from fifteen to thirty feet in height—the third are from six inches to a sufficient size for immediate use—the fourth consist of full grown trees.

Of the first class, immense numbers have been cleared and pruned—of the second, about *eight thousand*, and of the third, about *two thousand* have been cleared, allowing them sufficient space to expand. At a moderate estimate, the Judge thinks the second class, those between two and six inches, will be fit for use in twenty years—those of the third class six inches, and upwards, on an average in ten years. As the sizes vary, some will arrive at maturity long before others. The ground will hold a greater number than would stand erect, if full grown.

Of the second and third classes, the Judge thinks at a low estimate, he will be able to clear out from twenty to thirty thousand this year. The growth, which has been cut away, consists of hickory, water oak, and cedar pine. The live oak, like the chesnut and locust, springs from the roots and stumps of the mother plant, so that by taking proper pains, and by confining the operation to those spots, where they have been planted by nature, the danger of the destruction of this valuable timber may be prevented.—Still the forming of nurseries from the acorn is worth the experiment; and although the period before the acorns will become trees fit for use, must be great when compared with the duration of human life, yet it may be short in comparison with the age of a nation.

England is only now beginning to use those trees, which were planted seventy or eighty years ago. The tree, however, which has the benefit of an ancient and extended root, is of very rapid growth. The live oaks, preserved in Judge Brackenridge's door yard have, in five years, increased from the diameter of four inches to eight.

If the experiment at Deer point should equal present expectations, the plan can be put in operation on a more extended scale, at different places along the coast of Florida, Georgia, and South Carolina, and the several islands along their coasts, which are now, generally well set with this valuable growth. According to the reports of the Commissioners, who have been employed in examining and selecting live oak along our coast, there are several millions of live oak trees on the Sound of St. Rosa and the Bay of Choctawhatchie, and all so situated as to have the advantage of navigable waters to our Navy Yard. If five million trees can be preserved from tresspassers and fires, they will soon become of incalculable benefit for naval purposes.

Establishments may be made where our superannated and disabled seamen may be profitably employed in light healthy labour, at the same time that they are taken care of, instead of being turned adrift in old age, or when no longer able to encounter the hardships of the sea."

To select apple graftings.—Apples containing a large portion of saccharine matter, will make cider that will preserve the longest. This property can be easily distinguished, by plunging them in a strong solution of salt and water; the poorest sort will keep nearest to the surface. In this manner graftings can be taken from the best sorts.

[The following interesting and valuable paper we take pleasure in transferring to the columns of the Farmer. The language is bold, and the style by no means inelegant. Against the doctrine advanced, a single perusal suggests to us no objection, except it be the severity of the writer in respect to the errors in medicinal practice. The evils, too, of these errors, seem exaggerated.]

ART. 57.—*Thoughts on the Changes and their Causes, which are perpetually occurring in Material Creation.* By CHARLES CALDWELL, M. D. Professor of the Institutes of Medicine, and Clinical Practice, in Transylvania University.—Read in the Lexington Medical Society. [From the Transylvania Journal of Medicine &c.]

MR. PRESIDENT AND GENTLEMEN,

There is reason to believe, that perpetual change, is a fundamental requisite, and a never-failing phenomenon, in the condition of the UNIVERSE. It cannot be doubted, therefore, that it is the result of principles founded alike in wisdom and beneficence, and governed by laws established and administered by the AUTHOR of all things. Being, apparently, then, a favourite production of Divinity, it is worthy of the most profound meditation of man. Hence I feel secure of your attention, while I make it the topic of a few observations.

As respects any changes of form that may occur in the entire mass of material creation, we might indulge in conjecture, but we have no knowledge. Nor, with our present limited means of instruction, is it probable that our information, with regard to them will be rapidly accumulated.

But, as relates to certain subordinate portions of creation, the case is otherwise. On them our daily observation rests; of their condition and economy we are sufficiently informed; and there we know that ceaseless mutation is the established order. Of them therefore, I feel myself authorised to speak; to dwell, for a moment, on the changes they exhibit, and briefly descant on the causes that produce them.

By astronomers the organization and government of the solar system have long since been explored, and satisfactorily ascertained. Nor have their inquiries been bounded by this portion of the heavenly bodies pushed far beyond such narrow limits, into the wide and gorgeous fields of space, so abundantly "fretted with golden fires," they have compassed in their ken other suns and other systems, magnificent in splendour, size, and arrangement, and almost countless in number. And, wide and varied as has been their range, wherever they have reached, perpetual motion and change are exhibited. While, in obedience to its own laws, each individual system changes incessantly its aspect and bearing, the whole, united in a confederate and universal system, and subjected to the influence of universal laws, move onward at once, attracting and attracted, impelling and impelled, sustaining and sustained, in a march which constitutes the glory of creation.

This sublime and orderly progression of the heavenly bodies, constituting what is denominated the "harmony of the spheres" has furnished, for ages, matter of profound calculation to astronomers, a theme of enraptured song to poets and prophets, and a subject of intense admiration and delight to the entire world of cultivated intellect. Nor will it cease to sustain these varied relations, and produce these effects, while intelligence shall have being, and emotions of sublimity, grandeur, and beauty, shall belong to the soul. But to decend from this excursion through the heavens, to a sober survey of the globe we inhabit, respecting which our information is more minute, and our knowledge more accurate.

Here, mutations multiply, brighten, and magnify to the view, in proportion to our proximity to the scene of action.

The movement of the earth along the ecliptic path, gives to us, in succession, the variety, beauty, and indispensable boon of the changing seasons, while to its constant revolution on its own axis we are indebted for the grateful vicissitudes of day and night. To another of its movements are to be attributed, in part, the varieties we experience in relation to moonlight.

In the airy ocean by which our globe is surrounded, mutation is perpetual; for the most part beautiful, and salutary; but at times, indiscribable in grandeur and terror, and overwhelming in the temporary ruin it produces. It varies from the gentle fanning of the breeze, to the headlong and desolating sweep of the tempest; and from the fleecy rack, which flits across the sky, scarcely specking its cerulean brightness, or intercepting a sun-beam, to the deep gloom and appalling bursts and movements of the thunder-cloud. Nor must I forget the igneous meteors, of every description, at times playfully brilliant and beautiful, and at other times sublime and threatening in aspect, which kindle their fires in upper air, the bow which suspends from the rain-drops its celestial drapery, and the still more rich and radiant glories, with which the sun adorns the morning and evening clouds, as he emerges in the east, or tempers his fervors in the western wave. Such are a few of the atmospherical changes which are constantly presented to us; to which may be added, vicissitudes of temperature, whether sudden or gradual, with mists and rains, hoar-frost, hail and snow, and various others which time will not permit me to enumerate.

On the immediate surface, and to a moderate depth in the exterior covering of the earth, changes are per-

petual, some of them slow, and innocent or useful, and others rapid fierce, and destructive. Tempest-beaten cliffs are tumbling into gulfs or vallies at their bases, time worn rocks are crumbling into sand and dust, and the very hills and mountains are gradually passing, with the torrents that wash them, into the narrow depths and humbler levels by which they are skirted. Nor is this all. Setting restraint at defiance, and outstripping time, in the march of their operations, the convulsions of the earthquake, and the eruptions of the volcano effect, in an hour, mutations that well might be the product of ages. As if omnipotence were, for a time, consigned to their keeping, mountains sink and spring up, at their bidding, rivers forsake their long-worn channels, and fathomless lakes usurp the places where hills and plains, and other modifications of dry land had reposed.

Still more striking are the motions and changes which are incessantly manifested in the world of waters. The gushing fountain, the smooth-gliding streamlet, the dashing torrent, the deep and silent rolling of the majestic river, and the precipitate leap of the far-resounding cataract, which are the delight of the poet, and afford to the philosopher matter of contemplation, are subjects of observation, and well known to all.

But, it is in the mighty deep, the "exhaustless source and repository of floods," that the most august and magnificent changes are exhibited. It is in the stupendous agitations of that immeasurable mass of waters, that the whole power ordinarily employed in the economy of the universe would seem, at times, to concentre its force.

Even in the depth of the most breathless calm, its heavings are not only incessant, but appallingly portentous, as indicative of strength which nothing can resist. They are the tossings of a giant, in a perturbed sleep, threatening to terminate in a paroxysm of rage. Its regular tides and currents constitute in it another kind of motion and change which never ceases. So do the disemboguing of rivers into it, and and the ascent from it of its own waters, in the form of exhalation, by the influence of the atmosphere and the action of the sun.

But we find in winds the chief cause of the agitations it exhibits and the changes it experiences. These changes vary in extent and force from the curling of its surface, effected by the breeze, through the swelling waves, excited by the gale, to the foaming surf and mountain billows, the product of the tempest.

A further change in the world of waters, especially in the ocean, that claims our attention, is the result of the action of severe frost. This appears, in its maximum, in the polar regions, in the formation of glacial islands, of fearful extent, and of ice-bergs, whose summits form a resting place for clouds. No wonder then, that, in contemplating it, in its own vastness and power, and under the grandeur of these diversified and mighty changes, the high gifted poet should have hailed the ocean, in the following rich and magnificent apostrophe :

"Thou glorious mirror where the Almighty's form
Glasses itself in tempests; in all time,
Calm or convulsed—in breeze, or gale, or storm,
Icing the pole, or in the torrid clime
Dark-heaving—boundless, endless, and sublime—
The image of eternity—the throne
Of the Invisable; even from out thy slime
The monsters of the deep are made; each zone
Obeys thee; thou goest forth, dread, fathomless, alone."

Another sourse of change in our globe, alike abundant and important, is that of propulsion, arsing from the forcible impulse of one substance on another. Illustrations of this we find in the rebounding of bodies that have been hurried into collision, in the movement of those that have been subjected to a blow, and in the flight of arrows, bullets, and other misles, directed against an enemy, or intended for any other purpose of destruction or amusement.

Of these various changes in material creation, all are not the product of the same causes; all do not result from the same principles of action; nor are they all governed by the same laws.

When matter moves in masses, and exhibits changes on an extensive scale, it is influenced by one or more of the principles of the attraction of gravitation, elasticity, or mechanical propulsion. Of this kind are the magnificent movements of the heavenly bodies, the rush of the typhoon, and the whirl of the tornado, the bolt from the thunder-cloud, the convulsions of earthquakes, the eruptions of volcanos, the flight of arrows, bullets, and other misles, the descent of falling bodies, the lapse of running waters, the phenomena of tides and the raging of the ocean when lashed by the tempest. To the same principles are we to attribute the play of the mercury in the barometer, the elevation of water by suction and forcing pumps, the action of the steam-engine, and the ascent of balloons, and other bodies inferior in specific gravity to atmospherical air.*

All these changes I say, with many other analogous ones, which the limitedness of my time forbids me to recite, are the product of principles denominated mechanical, which operate on matter in large masses. nor are any other principles but these concerned *immediately* in the production of the movements which

* I am not to be here understood, as asserting, that mechanical causes produce a stream of lightning, the imprisoned gas which engenders an earth-quake, the steam in the boiler of the steam-engine, or the gas by which the æronaut inflates his balloon. My meaning is, that those agents, when in existence and operation, produce their effects mechanically.

I have here attributed to them. Indeed it will be presently made to appear that there are three distinct sets of principles, with their kindred laws, which produce and govern the various changes that occur in all kinds of matter, of which we have any knowledge; and that they are so completely insulated, as to operate, each exclusively in its own sphere, and never to intermingle their influence or action.

These principles and laws, as may be stated now, with sufficient propriety, are denominated mechanical, chemical, and vital. Many changes in matter, resulting from the first set, having been already mentioned, I shall proceed to a recital of some of those which are to be regarded as the product of the other two.

Of the changes already referred to, a few are the offspring of chemical agency. These are the conversion of water into ice, vapour and steam, and the formation of gases in earthquakes, volcanos, and the discharges of fire-arms, and of gases generally, whether by artificial means, or in what is not inaptly termed the laboratory of nature. But as soon as gas and steam are generated, escaping immediately from the influence of chemistry, they obey, in their action, which is simple propulsion, the principles and laws denominated mechanical.

To the department of chemistry would seem to belong the changes of temperature characteristic of the different seasons of the year, and of day and night, as well as those sudden and sometimes great vicissitudes, from heat to cold, and the reverse, which occur irregularly in all climates, but most frequently and strikingly within the temperate zones, and in the vicinity of mountains, lakes, and arms of the sea. To the same department is usually referred, the formation of dew, the passage of vapour into clouds, its reconversion into water in the form of rain, its change by chrystallization, in the higher and lower regions of the atmosphere, into snow and hoar-frost, and the congelation of water, in upper air, into the meteor hail. In some instances even the inscrutable substances of light, electricity and galvanism, are, at once, subjects and agents under the influence of chemistry. Caloric, which, by its subtlety and power, approaches to spirituality, is always employed by it as its master operator.

But the scope of this rich and beautiful science is not confined to the atmosphere, and the surface of the waters and the ground. It penetrates the earth, makes its way to its most secret caverns and precious cabinets, where the diamond and the ruby display their lustre, and, besides many other manifestations of itself, is seen in splendour in stalactitic columns, and frost-work, the apparent productions of the genii of the place, and, in all its glory, in the gorgeous furniture of the sparry cave. Nor do we fail to recognize its opulence in the abundant boon of the precious metals which it offers to our acceptance. Indeed the entire range of mineralogy, although not strictly and technically a branch of chemistry, is so far under its influence, that most, if not all the substances it embraces, received originally, from chemical principles, their texture and figure. Nor, in all these various productions and changes, have the mechanical principles had the slightest agency. By those of chemistry alone have they been effected.

Were I to descend to the curious but diminutive laboratory erected by man, and enumerate the various changes in matter, which are there produced, it would be little else than a rehearsal of what I have already represented, as done in the more magnificent workshop of nature. True, certain artificial processes, altogether new, are there instituted, and certain compounds or simples, not hitherto found in nature's storehouse, are occasionally the result. Greater purity, moreover, is given to substances which nature presents to us. But still the principles which actuate and the laws which direct, in every process, are those of chemistry; and may be included under the terms attraction and repulsion. They are the principles and laws which produce and govern the mutations of matter, not aggregated in masses remote from each other, but divided into its elementary parts in close approximation. I need scarcely add, that those principles and laws effect changes in such matter only as is destitute of life. On this point it shall be my business to dwell more particularly in a subsequent part of this paper.

But by far the most varied and curious, beautiful and interesting changes in matter remain to be mentioned; changes characterized alike by wisdom, goodness and power, and worthy, in all respects, of the creator, director, and sustainer of a universe. They are those that are manifested by the multitude of living organized beings, which constitute the vegetable and animal kingdoms. Of the immensity in number of these mutations, some conception may be formed from the fact, that they are as numerous as all the various phenomena exhibited by the untold myriads of individual living beings, vegetable and animal, that people our globe. For, extravagant as to some perhaps the assertion may appear, there are no two living beings precisely alike. Each one bears the mark of some change or modification of matter peculiar to itself.

The sources and grounds of the changes that occur, in living matter, are numerous. They begin with birth, are manifested in growth and decay, and consummated in death. After death, the body becomes again the subject of the principles and laws of chemistry.

The great instruments or rather means of the chan-

ges effected in the system of living beings, are digestion and nutrition, secretion and excretion, absorption and intellection. On the operation of each of these let me beg permission to offer to your consideration a few remarks.

Let me previously, however, ask why is it that the departments of chemistry and mechanics are considered completely insulated, and distinct from each other? I answer, because, in their operations, they never interlock; and because the principles and laws of the one can never produce the changes, nor exhibit the phenomena, that belong to the other. Hence, no one has ever alleged, or even suspected, that, in any process, they operate in common. On the contrary, they, in most, if not in all cases oppose each other. The application of this will appear hereafter.

The changes which are effected in digestion and nutrition are striking and specific; such as never do or can occur elsewhere, because the processes themselves are specific, having no affinity or resemblance to any other. And from specific causes specific effects must necessarily issue. The powers which these processes possess and manifest, might be almost, without a figure, denominated *creative*. Plastic and convertive they certainly are, in a very eminent degree. Compound substances of one kind they convert into compounds of another, so totally different as to retain no similitude to those out of which they were formed. As relates to them, metamorphosis is no fable. In our own race, they convert common masses of dead alimentary matter into the symmetry and beauty, and endow it with all the energies, of the human system. The most exquisitely beautiful and lovely of our race are but manufactures from the viands that cover our tables. What would seem most extraordinary is, that it matters but little of what description or character those viands are. Whether they are fish, flesh, or fowl, animal, vegetable, or mineral, simple or multiplex, dressed plainly or in the highest style of art, the result is the same. They are converted into the curious being called man. Undergoing solution, peculiar in its kind, they are changed first into a white, and then into a crimson fluid, and, by organization, appear again in a solid form, characterized by the elegances and excellencies of the human frame. Were it not that familiarity takes from this metamorphosis its force and impressiveness, it might be deemed miraculous. To spread on a festive board a course of common alimentary fare, and seat, at the head of it, a living Venus de Medici, in the vivacity of youth, the bloom of health, and the pride of beauty, and assert that the former could be converted into the latter, would be pronounced a fiction, of the wildest character, had not the experience of all time established its truth. And yet, as will appear, hereafter, some pseudo-philosophers have the folly and hardihood to pronounce this chemistry. As well might they contend, in their frenzy of hypothesis, that all the sublime intellectual operations of a Newton, a Leibnitz and a Milton were nothing but the ebullitions of an acid and an alkali. The very conception is treason against science and nature.

If we direct our observation to the lower orders of animals, even to those of the insect tribes, we shall find the changes effected in them by digestion and nutrition no less striking. Perhaps they may seem in some cases more so.

In many of those animals that subsist wholly on liquids there is much solid matter; and no small amount of fluids in those whose food is solid and dry.

The humming bird and at least one species of the bird of paradise sip, as their aliment, the saccharine but liquid and colourless secretion of the nectary of flowers. Yet do they possess bone, and muscle, and gland, and skin, and plumage of the most beautiful texture, and as gorgeous in colouring as the bow in the heavens.

Some butterflies are believed to banquet only on the most highly rectified and purest dew. Yet have they, in their bodies, no small amount of solid matter; while, in the exquisiteness of texture, and the richness and variegated tints and lustre of their wings, they set at defiance the language of description, and surpass even the highest execution of the pencil.

The common moth subsists on dry hair and wool, and the annobium maculatum, on the most perfectly seasoned wood; yet has each, in its system, a considerable amount of liquid matter. The same is true of the terebellum marmoreum, and the terebellum saxosum, although, as its name imports, the former subsists exclusively on marble, and the latter on stone of a different character. Nor do the marble and stone resemble any more the animal fluids and solids, into which they are thus converted, than they do solids and fluids of any other kind. So wonderful is the metamorphosis, in animal nature, effected by the processes of digestion and nutrition. And yet, I repeat, that some men have the presumption and folly to denominate it chemistry.

Nor, in the vegetable kingdom, are the changes produced, by digestion and nutrition, less striking and beautiful.

Some plants feed exclusively on water, many depend for much of their food on the atmosphere, and not a few derive from that source their entire subsistence. Other plants extract, by roots, from the soil, the chief part, if not the whole of the materials that nourish them. Yet are these several families of plants equally healthy, vivacious, and flourishing, and, when subjected to analysis, are found to consist of the same elementary ingredients. This is no less true of plants that grow in different soils, and differ-

ent atmospheres, remote from each other, than of those that grow in clusters in the same atmosphere, and the same soil. The elements that compose them are the same, and exist in the same relative proportions. Nor do vegetables exhibit, in their composition, any more of the elementary ingredients of their native soil, than they do of soils incapable of producing them. So entire is the change they effect on what nourishes them.

It is now, perhaps, the universal opinion of the most enlightened phytologists, and appears to be founded in truth, that many plants which seek stability, by rooting themselves in the ground, derive from thence no particle of nutriment. This is the case with some of the palms and canes, and not a few others of the most succulent plants of tropical climates. It is, in a particular manner, true of a great variety of those productions of the vegetable kingdom, which embellish, by the elegances of their form, and the splendours of their colour, the arid plains of the Cape of Good Hope. In that parched region of the globe, no rain falls, except during a few weeks in the winter, when active vegetation does not exist.

During the summer and only productive months, so adust is the soil, that no portion of either moisture or vegetable nutriment can be extracted from it. Yet is the vegetable kingdom luxuriant and flourishing, almost beyond example. On the atmosphere alone, then, and the dews that fall, must the plants depend for all their nourishment. Heavy falls of rain, which have been known, on rare occasions to occur, prove highly injurious to them. The Solandra grandiflora, a beautiful flowering shrub of Jamaica, derives its nourishment solely from the atmosphere, in a parched soil, and is injured by adscititious supplies of water.

Many species of the genus cactus, of which the common prickly pear is one, depend for nutriment, exclusively on the atmosphere. Although a sandy barren soil affords them fixture, it gives them no food. They live on air and the moisture it contains. Hence, when completely deracinated, and suspended by cords, they continue to grow and flourish with vigour. And they yield, on analysis, the same component parts, whether they are connected with the earth, or hanging in air.

But perhaps the most remarkable instance of atmospherical subsistence, that can be placed on record, occurs in the case of the *epidendrum arium*, an oriental plant, of great beauty, and exquisite fragrance. It is a native of Java, and India beyond the Ganges. At once to adorn and perfume their apartments, it is the practice of the inhabitants to pluck it up by the roots, and suspend it from their ceilings, by silken cords, richly ornamented by tufts and tassels. In this condition it is never even moistened by water, but subsists exclusively on the atmosphere around it. Yet does it continue to flourish in health and vigour, for many years, putting forth periodically fresh leaves and flowers, and pouring out copious streams of the most delightful fragrance.

Perhaps more than half of the very extensive family of the fuci have no roots, either to attach them to the soil, or to derive from it nourishment. They must necessarily, therefore, subsist on the atmosphere and moisture. Yet do they yield, on analysis, many elementary ingredients, which chemistry is unable to extract from the medium in which they live, and from which alone they derive their aliment. Although the very lowest and simplest forms, then of living matter, still are they superior in their powers to chemistry.

One of the most luxuriant and celebrated plants that the earth produces, is known to subsist principally on water, and to form out of it all the elements it contains. It is the lotus of the Nile. So rare in beauty, and so delicious in fragrance, that, in the language of poetry, its very name is identified with voluptuous enjoyment, and so choice in all things, that it has been presented as an acceptable offering to the gods, that plant derives its nourishment, and forms, by its mutative energies, all its attributes, chiefly from the turbid waters of its parent river. A change more striking is scarcely to be found in material creation.

In the kingdom of living matter, secretion is another process abundant and diversified in the curious mutations and conversions it produces. The substance in which those changes are effected, is the blood of animals, and the sap-juice of vegetables; in each case the source of nourishment to the being possessing it.

As the blood of animals is a fluid very strikingly different from the alimentary articles out of which it is formed, so are the secreted fluids, derived from it, no less different from the fountain that yields them.

They are, in the higher orders of animals, the gastric and pancreatic juices, bile, mucus, saliva, tears, oil, fat, semen masculinum, cerumen, perspirable and menstrual matter, the synovial fluid, the humours of the eye, the black pigment which imparts colour to the skin of the African, and the nervous fluid, supposing it to have an existence. To these may be added musk, castor, the offensive fluid emitted by the polecat, and a few other odorous matters which need not be recited.

Descending to the inferior orders of animal existence, we find there, the inky fluid of the cuttlefish, the electricity of the torpedo and the gymnotus electricus, the various poisons of the serpent tribe, and those of the scorpion, the tarantula, the asp, and

other kinds of venomous insects and reptiles. All these are secreted matters, and results of changes produced by vital action on the blood. A fluid *sui generis*, perfectly dissimilar to all others, is thus, by secretory economy, converted into numerous other fluids, neither possessing between themselves the slightest mutual family likeness, not any likeness to their parent source. In each of these secreted liquors are ingredients found, which no analysis can detect in the blood.

Out of the blood, moreover, is prepared, by what may be correctly denominated a secretory process, the matter of bone, cartilage, tendon, muscle, nerve, brain, skin, hair, nail, and every other solid substance of which the body consists. This is another very striking instance of the multifarious product of vital action from a single fluid.

From the blood or sap-juice of vegetables, which like the blood of animals, is a specific fluid, is also generated, by secretory action, a great variety of compound substances, equally different from each other, and from their parental source.

These are gums, resins, balsams, and oils, both bland and essential, camphor, asafœtida, and gum elastic, each of them a substance peculiar in character, all matters of colour and odour, as the green of leaves, and the innumerable hues and fragrance of flowers, bitter, acid, acrid, and saccharine juices, and the entire catalogus of vegetable poisons. Among poisonous juices may be mentioned those of the poppy, the tobacco plant, the datura stramonium, the nightshade, the henbane, the hellebore, the Kalmias, the rhuses, the mancinella, the upas, and many others, some of them natives of our own, and some of foreign countries.

All these are secreted substances, formed, by vital action, from the sap-juice of vegetables, and as different from *it* as they are from each other. As far as its character is known, the real blood or nutritious liquor of every plant, like the blood of every animal, is bland and innocuous; and exhibits none of the peculiar, and deleterious qualities, which belong to many of the substances formed from it by secretion. The real sap-juice of the poppy has in it no opium, that of the sugar-cane and sugar-maple, no saccharine matter, nor has that of the mimosa nilotica any gum arabic. The same is true of our muskmelon and watermelon vines. In the latter there is nothing sweet, and in the former nothing fragrant. It is secretion alone, that gives those delicious qualities to the fruit which they produce.

A more complete and delightful metamorphosis the poet has never *imagined*, in his moments of inspiration, than that which the lotus, the jessamine, the Magnolia, and the rose actually *effect*, when they take up matter, which, far from being attractive to either of the senses, is indifferent or offensive, and convert it, by their peculiar action, into the surpassing beauty and fragrance of their blossoms. I repeat what I have heretofore uttered, that did not observation assure us of the reality of this change, we would regard it as a fable. The conversion of Daphne into laurel, or Progne into a swallow, would seem scarcely less incredible. Before dismissing the consideration of the changes produced in living matter, by digestion, nutrition, and secretion, a few thoughts on their causes will not, I flatter myself, be unacceptable to you.

As relates to the causes of the changes which occur in living matter, or the principles and laws by which those changes are produced and governed, three distinct hypotheses are maintained. These are the chemical, the vital, and the chemico-vital.

The first alleges that, both in its origin, changes, and dissolution, living matter is completely under the influence and governance of chemical principles; and that, therefore, in reality, every living body is nothing more than a chemical laboratory.

The second hypothesis places living matter, with all the changes and phenomena it exhibits, under the exclusive control of principles denominated vital. Those principles and laws it pronounces to be insulated, and, in all respects, as essentially different, and as radically distinct, from the principles and laws of chemistry, as they are from those denominated mechanical.

The third hypothesis professes to be a compromise between the other two, and, like most midway courses, is time-serving and unsteady. Its advocates are aptly denominated *chemico-physiologists*. This term is appropriate, and denotes very happily the character of those to whom it is applied.

Those dogmatical expounders of nature become the victims of their own policy. By aiming at too much, they forfeit the standing in science, which they might otherwise attain. Their grasping ambition impels them to make an effort to render the domain of chemistry coextensive with the limits of matter.

In their estimate of things, that science is necessarily concerned, in every change that occurs among the elementary particles of compound bodies.

Convinced, however, not only of the impossibility of explaining, but of the absurdity of attempting to explain, by means of chemistry, all the changes and phenomena that living matter exhibits, and, at the same time, determined not to abandon their unfounded claim on that elevated and beautiful department of nature, the "chemico-physiologists" have endeavoured to make that incongruous mixture of *immiscible agents*, from which they have so fitly derived their appellation. "True, say they, the various proces-

ses of living matter, such as digestion, assimilation, nutrition, and secretion, are not performed exclusively by chemical agency. They are functions partly chemical and partly vital. The changes they exhibit, therefore, in elementary matter, are the result of a co-operation of different principles."

Let us examine, for a moment, these propositions. Let us analyze them, and weigh them fairly in the balance of reason and sound philosophy, and see whether they are sterling in quality, and competent in weight; or whether, on the contrary, they are not counterfeit, in the one, and wanting in the other.

The principles of chemistry and vitality are universally acknowledged to be different from each other. Many who have studied them very zealously, and, perhaps, I might say profoundly, consider them as opposites. Facts are not wanting, which seem to indicate that they are so.

They are engaged, according to the hypothesis we are examining in the performance of the same animal function. But they cannot be engaged on equal terms, else would they greatly interrupt, if not completely neutralize each other. They would exhibit the distraction, and destructive ravages of civil war. They would be a house divided against itself, of which common sense and all experience unite with the oracles of revealed truth, in positively proclaiming, "that it cannot stand."

One set of principles, then, must be obedient to the other, and must submit to its control. It must become a mere instrument in its hand, to be wielded by it at pleasure. Its actions must be so changed and modified by it, as to be no longer its own; its influence swallowed up and lost in that of its superior.

The elementary particles of living matter cannot obey, at once, the laws of chemistry and the laws of vitality. They must "choose which of the two they will serve;" and, in doing this, they must "cleave to the one, and reject the other." This is no paradox, or tissue of sophistry. It is sober common sense. It is a primitive truth. A common and divided influence is a neutralized influence; or, rather, it is no influence at all. Nothing decisive can ever be effected by it.

Do chemical principles predominate, in the functions of living matter? The "chemico-physiologists" will not answer affirmatively. Truth compels even *them*, to reply in the negative, otherwise the functions would not be designated by the term *living*. Then must vital principles and laws predominate, and chemistry becomes, in these functions, a nullity and a name. It becomes precisely what vitality makes it. But vitality metamorphoses entirely its wŏrkings and results and hence it is chemistry no longer.

We confess, say again the "chemico physiologists" that digestion, nutrition, and secretion are processes, in which *ordinary* chemistry mingles not its influence. They are the result of *animal* and *vegetable* chemistry.

It is, then, come to this! Have these self constituted philosophical potentates, who aim to be lords of material creation, and to subject the whole to chemical supremacy, fallen thus ingloriously from their "high estate" to take shelter under the subterfuge of a mere name? Do they imagine that a word can *be made* to alter the nature of that which it designates? that they can change the process by changing its appellation? The trick is too shallow, and cannot avail them. It is a feeble and disingenuous bartering of substances for shadow; an abandonment of sense for a substitution of sound.

By this "precious confession" they have conceded every thing, and are a body militant no longer. They have acknowledged that the processes of digestion, assimilation, nutrition, and secretion cannot be performed by ordinary chemistry; and that is all for which the vitalists contend. By animal and vegetable chemistry can be meant nothing else than a system of operations and functions governed by animal and vegetable laws; and that is *vitalism*. It is a positive acknowledgment that, in living organized matter, the changes which occur are the offspring of principles and laws, insulated as to extent, specific in character, and as distinct from chemistry as they are from mechanics.

Do the chemico-physiologists contend, that although the processes of what they call animal and vegetable chemistry differ from those of ordinary chemistry, they are, notwithstanding, governed by the same laws?—The position is not only unsound, but preposterous; an outrage on the immutable principles of causation. The same physical laws, operating uncontrolled, always perform the same processes and produce the same effects. When this ceases to be the case, then may we expect the streams to flow upward, and ponderous bodies to fly from the earth into the heavens, by the power of gravitation.

If the animo-vegeto-chemical philosophers will define their science to be, a series of changes among the elementary particles of living matter, governed by laws possessing different powers, operating under different circumstances, and producing different results, from the laws of the ordinary chemistry of dead matter, then shall I cease to be their opponent, in fact, although I shall still contend, that their nomenclature is unfortunate; because it tends to the propagation of error. But as long as they continue to identify it, in the slightest degree, with the common chemistry of their laboratories, I shall deem it my duty to expose their fallacy, and counteract the contaminating influence of their opinions, by every fair expedient I can devise, and every honest exertion I

can make. And, without pretending either to the spirit of prophecy, or any uncommon degree of sagacity, I fearlessly tell them, that their hypothesis will be dissipated, by the increasing lights of science, as the shadows of night retreat from the sun.

(*To be continued.*)

Mr. Editor,—As I am frequently applied to for information respecting English Hawthorn Fences, I take this method of making it public, if favored by an insertion in your widely circulated paper.

Your obedient servant,

Utica, N. Y. Mar. 31 1829. William Penton.

ART. 58.—*Directions for Planting English Hawthorn Fences.*

After regulating the lines on the ground intended for the fence, prepare three feet wide, by digging or deep ploughing. In the centre of this open with a spade, a trench one foot wide, and the same in depth, casting the mould to one side, and on the opposite, planting the thorns at the distance of three inches from each other, taking care to spread the roots, and place the stems full one inch deeper than they were in their original state, which may be observed on the bark of the plants. If any part of the ground be poor, it will be much improved by putting some old manure on it. After the thorns are regulated, fill in the earth, and settle it firmly with your feet, and as it is finished, dress off your ground and put a temporary pailing to it; if the thorns are taken care of, this will answer every purpose in six years. One thousand plants will do about sixteen rods. In many fences the thorns are planted at six inches distance, in two rows, each plant intersecting the other, and about nine inches between each line. Cattle must not molest the plants until they acquire strength to resist them.

Those who will begin in time these improvements, must derive many advantages in the value of their property. In the extreme heat of summer, the shade will be useful for cattle, and also in stormy and wet seasons, and in beautifying the farm with its flowers, whose fragrance go through every field; when overgrown, the dressings will answer the purpose of fuel, and fully pay for the trouble of cutting a part of them every fourth or fifth year, and by this system, a farm may be regularly gone through without any excessive labor; and at a time when no other work can be done.

It is well known that enclosed farms answer many purposes which enclosed ones will not. If the benefits arising from improved farms, (such as are generally in Europe,) were known, no doubt but there is a spirit for improvement in this country, which would make rapid strides in beautifying the western part of it, in connection with its many natural advantages; then would the traveller admire the beneficial changes that can be made by persevering industry and good taste. The time for planting is from the beginning of October, until the ground gets hard, and as soon as the spring opens, until the first week in May.

William Penton of Utica N. Y. has about 300,000 English Hawthorns for sale, which he raised himself from imported seed, and will be found superior to plants that are long out of the ground; he will also still be supplied in the nursery line.

ART. 59.—*Plants, like animals, propagate their species by means of sexual organs.* [From the N. E. Farmer.]

Mr Editor, "A Farmer" in your number of March 20, states that his grand-father, seventy years ago, planted out an orchard of natural fruit, from a nursery on his farm, all the trees of which produced apples exactly of the same kind; and he asks for the cause of this novel circumstance.

There is one, and only one, philosophical way of accounting for it, that I know of: *The seeds sown in the nursery must have been all taken from the same parent tree; and this tree must have blossomed in an isolated situation, remote from any other blossoming tree of the apple kind.* An apple, pear, peach, or plum seed, grown remote from any tree of its species, will produce fruit like the parent tree, and of no other kind.

Plants, like animals, have sexual organs, necessary and destined to propagate their species. In the fruits above named, and in most other plants, the male and female organs exist in the same flower, or on the same plant. The female (pistil) is in the centre of the blossom surrounded by the male (stamen.) On the points of the latter are the anthers, which contain the farina, pollen, or semen, the contact of which with the pistil, or female organ, is essential to the production of seed. These organs are conspicuous in the common lily of the meadow; and a familiar illustration of the importance and influence of the pollen on the progeny, may be cited in the maize. In this grain the male organs are the tassels, the female the silk, a fibre of which extends to every kernel on the cob. Cover this silk so as to prevent the contact of the pollen, or yellow dust which falls from the tassels, and there will not be a kernel of grain on the cob. Fecundate or dust it with a pollen of a dozen kinds, and you will find all these kinds upon the ripened ear. A field of maize, planted with one variety of seed, produces its kind pure; planted with a plurality of kinds, it will be strangely intermixed in the product. So with the apple; only the pollen of this is more subtle, and is conveyed from one flower to another, and from one tree to another, on the wings and bodies of insects

which are constantly roaming in pursuit of food. A seed can have but one mother, but it may have twenty fathers. Hence the care necessary in raising pure garden seeds, to keep each variety of a species separate and remote. And hence the cause that double flowers, called by naturalists monsters, so seldom produce seeds: the male frequently, and often the female organs, are converted into petals, or flower leaves, and cease to perform their natural functions.

This beautiful economy in the vegetable kingdom excited the observation and admiration of Linnæus, was the theme of Darwin's song, and has been rendered subserviant to our control, to our comfort, and luxury, by the indefatigable Knight, and other horticulturists of Europe. This last named gentleman was the first to give repeated demonstrations of the correctness of the theory, by practical results; and his example has been followed by horticulturists, florists, and seedsmen.

We are indebted to the labors of Mr Knight, in artificially crossing two known varieties, for some of the choisest productions of the garden and orchard. And that your readers may avail themselves of an early opportunity of profiting by his useful labors, I subjoin a brief description of several varieties, thus artificially produced, now growing in my grounds.

1 *Grange apple*—A fruit of great beauty, and similar in color to a very fine Golden Pippin.—Ripens in October, and keeps till February. From a seed of the Orange Pippin, fertilized by the pollen of the Golden pippin. The specific gravity of its juice, 1079, the same as that of the famous Styre cider apple. Obtained the premium in 1802.

2. *Downton Pippin.*—One of the most valuable apples for the table and press, Mr. Knight remarks, that has yet existed. I do not know any apple, says Salisbury, which can be brought to the market at any given price, with so much advantage to the cultivator. The tree is healthy, hardy, and handsome. Its fruit, in form, color, and flavor, resembles the Golden Pipin—ripens in November, and keeps till March. Sp. gravity 1080. Obtained the premium in 1804.

3. *Yellow Siberian*—From a seed of the Loan Pearmain and the farina of the Siberian Crab.—Considered very valuable for Cider, the specific gravity of the must being 1085 (water being 1000.) The tree is hardy, and said to be a great bearer. Exhibited in 1805, and obtained the premium.

4. *Siberian Harvey.*—From the seed of the Siberian Crab and the farina of the Golden Harvey. The juice of this apple is the heaviest known, being stated by Salisbury at 1091. Ripens the middle of October.

5. *Faxley Apple.*—From the same parents as the preceeding. A healthy, handsome tree, and when loaded with fruit, which it bears most exuberantly, is on the authority of Mr. Knight, singularly rich and beautiful. Specific gravity 1080. This and the preceeding are considered superior for the press, by Mr. Knight, to any apple that has been hitherto cultivated. They were both exhibited first, and obtained premiums in 1807.

6. *Yellow Ingestrie.*—Similar in color and flavor to the Golden Pippin. Ripens in October, and keeps till March. Among the best varieties of its season, and considered one of the handsomest fruits which has been grown.

7. *Elton Cherry*—From the Groffian and White-Heart. Tree luxuriant, and a good bearer—hardy. Fruit large, soft, sweet, juicy, and delicious. *Loudon.*

8. *Black Eagle Cherry.*—From the Groffian and Mayduke. Tree luxuriant, hardy, and a good bearer. Fruit dark red, firm, sweet, high-flavored, and ripens in July.—*Ib.*

9. *Waterloo Cherry.*—From the Groffian and Mayduke. Fruit deep red, large, conical, firm, sweet and high flavored. Ripens in July.—*Ib.*

10. *Downton Strawberry.*—I have grown this fruit for two years that measured four and three fourth inches in circumference.

11. *Knight's Peas* are too well known among us to need a description.

It may not be improper to remark, that the weight of the juice of an apple, newly expressed, indicates its richness in saccharine matter, and its subsequent strength after fermentation: the heaviest *must* producing the strongest liquor.

Albany, April 6th, 1829. J. BUEL.

ART. 60.—*Report of the Committee appointed by the Hamilton County Agricultural Society of Ohio, on Woad.* [From the Western Tiller.]

Woad is described in botany as a genus of plants of the siliculosa order, and tetradynamia class. There are four species; but the only one of value is the tinctoria, or common Woad. This is a biennial plant. The first leaves which appear are of an oblong oval figure, and of a tolerable thickness, with entire edges rounding off into obtuse points. The stalks grow to the height of about four feet, and have several branches covered with arrow shaped leaves. On the end of each branch are clusters of yellow flowers composed of four oblong petals in the shape of a cross. To these flowers succeed pods, which when ripe become black, and open with two valves, having one cell containing a single seed.

Woad is cultivated in many parts of Europe, and in small quantities in the United States, for the purposes of dying. It is used for forming a blue, and as a basis of many of the dark colors. It is, also, sometimes made use of in medicine as an astringent, and for healing wounds. The plant furnishes in win-

ter green food for cattle, especially for sheep; but when it is cultivated particularly for dying, it is recommended not to feed it down, as it is thereby weakened, and the succeeding crop injured.

In the culture of Woad it is necessary to be particular in the previous preparation of the ground.

The soil must be light and rich, and should be ploughed and harrowed fine, and constantly kept clean from weeds. The same ground should not be sown in Woad more than twice in succession. Woad may be sown either broadcast, in drills, or in beds. In the latter method the plants are to be transferred to the fields, when the tap roots are four or five inches long, and should be set out eight or ten inches apart.

In sowing broadcast, one bushel of seed is required to the acre; in drills the same quantity will answer for five acres. When the former plan is followed, the seed should be well harrowed in, and the plants must be thinned out to the distance of from six to ten inches apart. The seed should be sown early in the spring, and may be previously steeped one night in water to aid their vegetation.

The plant at first puts forth five or six upright leaves of about ten or twelve inches long, and six broad. When the leavs are of this size and begin to hang down, they should be cut. This operation must be performed as soon as they are full grown, whilst they are green, and before they begin to change their color, as when they remain on the stalks too long, and become pale, their quantity will be diminished, and their quality injured. The size and fatness of the leaves constitute the goodness of Woad.

There are five or six crops during the season, of which the first is the best, the latter being considered inferior, are kept separate. As soon as the leaves are cut they must be removed to a barn, and chopped into small pieces. They are then to be bruised by a roller, or bark mill, after which, according to the practice in England, the paste thus formed is laid in heaps, pressed close and smooth, and the dark crust on the outside if it happens to crack, is re-united to prevent worms from being produced in the crevices. After lying for about fifteen days, the heaps are opened and the crust mixed with the inside, and the matter formed into small balls which are pressed solid in wooden moulds. These balls are laid up to dry; in the sun they become black, in the shade yellowish, especially in damp weather; there is but little difference in the quality. The good balls are weighty, of an agreeable smell, and of a violet color when broken. To prepare these for the dye they must be reduced to powder. This powder is shovelled backwards and forwards, and moistened with water every day for ten or twelve days, after which it is stirred less frequently, without watering, and at length, when dry, made into heaps for the dyer. When water is applied to the powder it ferments, grows hot, and throws out a fetid fume.

Those plants which you wish to leave for seed, should not have more than two or three crops of leaves taken from them. If none but the outside leaves are taken off, the plants will grow stronger, and produce a greater quantity of seed. In England the seed ripens in August. When the pods turn to a dark color they should be gathered. This may be done by reaping the stalks in the same manner as wheat, and spreading them in rows on the ground. In four or five days the seed will be fit to thresh out. This should not be delayed too long, or the pods will open and let out the seed. The Woad forms a very deep blue, and is the foundation of so many colors, that the dyers find it necessary to use a scale to regulate the several degrees, from the brightest to the deepest.

Indigo has, to a considerable degree, superseded the use of woad, because it is more easily managed by the dyers, and its hues are more lively. Yet its color is inferior in many respects, especially in permanency; for which reason woad and indigo are frequently used in conjunction, the former to give solidity and substance, and the latter to give brightness. Astruc, a French writer, observes, that woad if cured in the same manner as indigo, produces as lively a color; and adds, that from some experiments made by himself, he is convinced the method would effectually answer. The committee would here also suggest, that an extract similar to indigo might be procured from woad, cured by the same method which is used in the preparation of indigo.

Messrs. Robiquet and Colin read before the Royal Academy of Sciences, in Paris, an article on the colouring principle, in which they recommend the following method of preparing woad for dying. Grind well the woad, and add two or three parts of clear water; subject the whole to a very strong pressure; repeat the operation three successive times; bruise well the the residue, and suffer it to be thus exposed to a liquid bath with five or six parts of water added to it, in which a sufficient quantity of alum has been previously dissolved. Afterwards strain well that liquid, and precipitate it by an addition of sub-carbonate of soda.

The precipitate thus produced must be very carefully washed in clean water. The maceration in alum water is then continued until it becomes of a properly thick consistence. The author adds, that by the above means you may obtain in three hours a result, which by the old method required as many months.

Woad has been cultivated to a considerable extent in Great Britain, Germany, Sweden, France, and Spain. In England an acre of land produces about a ton of Woad. In this country the climate and soil of the western States have been found even better adapted to the cultivation of woad than the soil and

climate of England. In confirmation of this, and in addition to what has been said on the culture of this plant, we shall quote from the American Farmer, a letter of Mr. Atherstane of Philadelphia. This gentleman formerly resided in the neighborhood of Cincinnati, where he cultivated the woad plant.

"I," says Mr. Atherstane, "cultivated some acres of woad in the state of Ohio, which I cut six times during the season; it produced about thirty cwt. to the acre; for which I received when brought to market, 12 1-2 cents per pound, equal to $420 per acre.

"I have been accustomed to its cultivation in England, where I used it for thirty years, as a manufacturer. The soil of America is quite as well adapted, and the climate of the middle, southern, and western states, is better suited to its growth, than that of Great Britain.

"The coloring matter was much stronger, the plant was more vigorous and rapid in its growth, and its product was larger than that to which I have been accustomed in Great Britain.

"It prefers a deep, rich, and light alluvial soil; its tap root extends a considerable distance below the surface. Fine tilth is necessary, but it may like Indian corn, be grown upon a sward reversed. I have found it a better practise to sow the seeds in beds late in the autumn, or early in the spring, if the climate be severe in winter When the plants have tap roots about four inches long, they should be set out, at the distance of eight or ten inches in rows sufficiently wide to admit either a plough and cultivator, or a ten inch hoe, as the husbandman shall determine, to keep them free from weeds. When the leaves are about nine inches long, but always before their color begins to change in any part, they must be cut as spinage, with a knife, placed in baskets, and carried into a barn where they must be chopped forthwith, by means of a chaff cutter or similar instrument, into pieces of about a quarter of an inch.

"So soon as they have been thus prepared, they must be bruised by a roller or bark mill, before they should have suffered from heating, which a very few hours would cause. The bruised matter must be rolled by hand into balls of two or three inches diameter, according to the heat of the weather. Care must be taken to expose it to the free operation of the air, whilst protected from moisture. When dry it may be stored in heaps. The subsequent crops may be twisted off, without the use of the knife, the roots at the latter stage of their growth are sufficiently strong to resist the necessary force to remove the leaves. It may be sown broad cast, but from the extreme lightness of the seeds, great difficulty is found in distributing them equally. In this mode, in consequence, bare patches disfigure the field and materially affect the amount of its product. The question whether the broad-cast or drill system should be employed, must be determined by the value of labor and land.

"I shall be very glad to communicate with any gentleman on its cultivation, as its importance to manufacturers makes it an object of great interest at this time in America.

"One bushel of seed, if sown in drills, will be sufficient for five acres; if sown broadcast for one acre. It is to be observed, that the woad must undergo the process of couching, before it is fitted for the manufacturer."

By comparing the amount of cash a farmer would get for a crop of woad, with that he usually receives for his corn, wheat, &c. we may discover the relative profitableness of each; due allowance being made for the labor necessarily attending the several crops. Fifty bushels of corn to the acre is a liberal allowance; at 15 cents per bushel, the proceeds would be $7 50. Supposing an acre of land to produce 30 bushels of wheat, at 62 12 cents per bushel, the amount would be $18 75. The tobacco planter for his first rate quality of common tobacco, will get at New Orleans about $4 per cwt. he may raise 1200lbs. on an acre, which at the above estimate, would amount to $48.00. Making the moderate allowance of one ton of Woad to the acre, each acre of this plant at 12 1-2 cents per pound, would be worth two hundred and fifty dollars.

The trouble attending the latter article is not considered so much greater than that which is requisite in the other cases as materially to affect the argument. We think it evident therefore, that it would be to the advantage of the farmer to devote to the growing of woad, some of the many acres now sown year after year in wheat and corn. These and the other common products of the country, are raised in such abundance, that the market is often overstocked with them, and consequently the prices kept down, and the farmer but poorly remunerated, if he does not actually sustain a loss.

By sowing some of this land in Woad, he would increase the variety of his crops, diminish the quantity of each in market, and thus raise the value of all.

It has been a subject of complaint, that the American blues and blacks are not permanent, and in consequence, the foreign cloths of these colors have had the preference. It is believed that the use of Woad would increase the durability of these colors, and thus raise the credit of the domestic manufacture.

In the eastern States, Woad is used to some extent, and the demand for it, is probably increasing. In Cincinnati, and in the West, generally, it is scarcely at all in use. This is perhaps occasioned by an ignorance of its valuable qualities, and by the difficulty of procuring it. When the article becomes better

known, and can be furnished in sufficient quantities it will probably come into more general use.

By the introduction of Woad, therefore, it appears to us, there is a prospect of benefit to the farmer, the manufacturer, the retailer, and the consumer.

Additional and weighty reasons for the cultivation of colouring matter may be drawn from the fact now satisfactorily established, that this country is well adapted to the raising of silk and wool.

Though the committee have not been able to give the subject under consideration, all the investigation its merits seem to require, it is their wish that the view they have taken of it may attract the attention of some of our enterprising farmers, and induce them to test by a practical demonstration the correctness of the opinions herein advanced.

Should our government, by persisting in that admirable course of policy so justly called the *American System*, continue to hold out inducements to the exertion of native industry, and to the development of those resources of wealth and greatness which we so amply possess among ourselves, this, and every other subject connected with domestic improvement, must increase in importance, and eventually force themselves upon the attention of the public.

Since this report was written the committee have received the following letter from Mr. Atherstane, of Philadelphia, in reply to one addressed to him on this subject. From this communication it will be perceived that the profits of woad would be greater than are set down in our estimate. Mr. A. says the product of his crop "was about 3360 pounds per acre, under very bad management." If the one half was sold at 12 1-2 cents and the other at 10 cents, the amount would be $378.

GEORGE W. BURNET,
NATHANIEL WRIGHT,
B. F. POWERS. } *Committee.*

Philadelphia, February 14th, 1829.

DEAR SIR—In my letter published in the American Farmer, referred to, I believe a general outline was given respecting the culture of woad; but if any gentleman should wish further information, I will furnish it at his request.

I will now answer the questions before me. I have tried the plant in the neighborhood of Cincinnati; it proved of excellent quality, containing more coloring matter than any I ever grew in England; the produce was about 3360 pounds per acre, under very bad management, much being wasted, and some of the last crop not gathered. That part of this crop gathered early in the season, was sold at 12 1-2 cents per pound, the other a fall crop at 10 or 11; but the general rule is to put them both together in the couch, a chemical process, or fermentation, which is always used in England; and from my practice, I believe, there is not much use in dying without it.

I believe there is more Woad used in Massachusetts than in any other state in the union; but I think some of the manufacturers grow their own in an imperfect way. The consumption of Woad is considerable in this neighborhood, and at present the article is imported from England, France, Germany, and some little from the Eastern States. The French and German drug, in its vegetable state, is selling at 9 cents; English at 11 to 12 1-2; American 7 to 7 1-2 couched, or having undergone the fermentation before mentioned. I have lately used some of English, and also of American, and find them of equal strength, but the latter had taken too much heat in the fermentation, which made it more difficult to work with those dyers not well skilled in the use of it. In fact the want of knowledge in the use of woad is the primary cause why there is not a greater demand for the article; but this evil will soon cure itself.

It is my opinion that much manufacturing must ultimately be done in the state of Ohio, and in the northern and western parts of Indiana. The land being calculated to support a large population, and well adapted to the growing of wool, the facility of procuring steam power at a cheap rate, and the distance you are from England, are all in favor of this opinion.

The woad must be sown annually. The way I have found most profitable is to sow in December, and plant out in rows as soon as the land is fit, and the plants large enough; but if that time is missed, it may be sown as soon as the ground is in order. I have known it sown in the month of May.

Woad is indispensable in the colors, blue, black, bottle green, purple and woad green, or olive; it is useful in many others.

Dying, at present is in its infancy in this country; but the progress of this, as well as of many other arts, will depend on the protection given them by the general government; and I am sorry to see so much difference of opinion upon a subject of such vital interest to our common country.

The woad plant will produce good winter keep, in a mild season, for sheep or neat cattle; but will give the milk a bad taste.

If any gentleman will undertake to try how the thing will answer, he may be supplied with fresh seed collected in the year 1828.

I do not know how long the seed will keep; but some four years old grew well with me last year.

Any communication you may make to me on the subject shall have my immediate attention.

I remain, respectfully.

JONATHAN ATHERSTANE.

Mr. G. W. Burnet, from the Committee of H. C. A. S.

ART. 61.—*Cultivation of the Vine in the United States.* By the EDITOR.

Although nearly half a century, and perhaps a greater period of time, has elapsed since the introduction of foreign vines into this country, still it appears yet to be ascertained, whether the imported grape will mature its qualities in this climate, or rather whether it would not be more expedient to cultivate and improve the vine of native growth. To assist in settleing this point we shall, in a serious of numbers, throw together the information we can collect from a variety of sources. For many important facts we shall be indebted to letters addressed to Mr. Dufour, published in the Western Tiller, printed at Cincinnatti. The following is an extract of a letter from Mr. Bringer, Surveyor General of Louisiana, to Mr. Dufour. It gives an account of the early attempts of the French to introduce the vine into that state.

"New-Orleans, 7th July, 1825.

"The culture of the grape from foreign countries was attempted in this state for the first time, about 38 years ago, with plants sent here from *Marseilles* in France. These were the common grapes of *Provence*, with which the Coast Wines are made. They grew very luxuriantly, and eleven years after the first stock had been introduced in this colony, I counted, ni 1796, upwards of 700 bunches, on one of those which was 3 1-2 inches diameter and about 50 feet in length, spreading 10 feet on an arbor built on purpose. Shortly after, these vines were trimmed as in Europe, by a French gardener, skilful in his trade, but the experiment proved unsuccessful. The abundance of suckers and sap, became fatal to these vines, and ever since, not a single bunch has ripened on them; they either scald when the suckers are taken off, or rot when they are left on; the stalk and the fruit is much more aqueous, though it was too much so (before being trimmed,) to make wine, for it always turned sour in the attempts which were made to obtain wine of them, when done making, it was more properly good vinegar than bad wine.

"Mr. Deghen introduced here from Leghorn, about 4 years ago, upward of 20 thousand plants of the Italian grape vine, which have nearly all perished, except a few plants which were planted in this city in the rubbish of old brick houses: those are thriving, as well as some Muscatel brought here about 20 years ago, and planted near the walls on high piles of rubbish mixed with the sweepings of the streets, which has proved to be the best soil for grapes in this country.

"We have here but 3 kinds of native grape, which are of the same sorts growing in bottom lands all over the U. S.; they are the small sour fox-grape, grains the size of a buck shot; one kind a little larger than the other only differs in as much as the larger kinds ripens later, and is a little sweeter, or rather, less sour: the 3d kinds is the Muscadine, to well known in the U. S. to say any more about it."

The next extract is from Mr. J. E. Graham, of Sparta, Alabama, dated February 12th.

"The culture of the grape vine has not been attempted in this vicimty, but it has been at what is termed the French settlement, in this state, in the neighbourhood of Demopolis, which is a small town at the juncture of the Black-warrior and Tombuckbee rivers. It was attempted by a few French emigrants who obtained from government a pre-emption title to a considerable extent of country, at that place for the express purpose of cultivating the vine, about the year 1818, but of what kind of grapes their culture consists, I can not inform you, neither do I know where they were procured, but in all probability from France. Their success has not been such as was anticipated at the time of their settlement, but it is said that this result was not occasioned so much on account of the unsuitable quality of the soil as of the inattention and negligence of the cultivators.

"I know of no kinds of grapes but what could with suitable management be cultivated with success in almost any part of this state. They grow spontaneously in almost every section of the state, particularly in the fertile uplands and the low grounds of large water courses. Their size is various as also their colour, according to their qualities; the large English grape, of a dark redish hue, is to be found in almost any quarter, and arrives at maturity in the month of September and October, which is about the usual time of maturity of all other kinds of which I have any knowledge. I believe no wine has been made in this state unless by the French in the settlement above alluded to."

The following is from Mr. Fauche to Mr. Dufour.

Greensburgh, Georgia, February 27th, 1825.

"In the year 1797, I saw in Buck county, on the plantation of the late Captain John Mitchell, about one quarter of an acre of regularly planted stocks of grapes, four feet distance from each other; the bunches of which were intended to run along, and be tied to *vine-props* perhaps, but some years afterwards I was informed that he had abandoned his project of raising grapes with a view to make wine, as his grapes rotted before coming to maturity. These exotic grapes, are the white kind, and every good fruit year these grow fine and abundantly, when made to run on frame: but I am inclined to the belief, that in process of time, the skin of the grape grows thicker, assumes a purple colour, and fills itself with a pulpy substance, in lieu of limpid juice; in this I may be mistaken.—In some wine districts of Europe, I know this to be the case; and what wine is made of pulpy grapes, is neither so strong, nor so well flavoured, as

that which is made from the transparent grape. This difference in soil, climate, and other causes, may exist here, as well as on the eastern side of the Atlantic.

"Our native or wild grapes, are the muscadine, which grows scattering, a size larger than an ounce ball, has a thick skin, and is filled with an agreeably tasted pulpy substance: our woodlands, also, produce a small red grape, the grains half as large as a buck-shot, more or less thick-set on the bunch; is comparatively more juicy than the muscadine, and is as well tasted, as any uncultivated fruit can well be. I have known excellent vinegar made of them, never wine; we mix water here, with every thing of the kind which we make, even with cider; and when fermentation is over the liquor sours."

We shall end our extracts for this number with one from Mr. Adlum, who has paid more attention, as far as we are informed to the cultivation of the native grape, than any other person in the United States.

Vineyard, near George Town, D. C.
February 23d, 1825.

"The kinds of grape that I cultivate and make wine of are as follows: The Catawba: I found this grape in the garden of a tavern about 24 miles from this place in Clarksburgh, Montgomery county, Maryland; the tavern keeper being dead, his family could only tell me that he called it the Catawba, and I have not been able to trace where it came from, but suppose it was from North Carolina, as a nation of Indians of that name resided there. When I got it, it was a very beautiful grape, of a black colour, and very pleasant for the table, but with me they are of a dark purple, with a beautiful bloom on them, and have a musky flavor; they are very great bearers and make excellent wine; they are also very hardy. When they are fairly ripe there is little or no pulp in them, and they contain a great deal of juice; size, larger than the Sweet Water. The Schuylkill Muscadel was found on the Schuylkill river, near Philadelphia, and was introduced into Mr. Penn's garden when he was governor of Pennsylvania, before the revolution; it is of a deep purple, nearly black, with a hard pulp, very sweet and rich, and when fairly ripe, with a slight musky flavor. The same description will answer for the grape called the Constantia, or Cape of Good Hope, with this difference, the latter has none of the musky smell. This latter one grew originally in the late Wm. Clifton's garden in Southwark, Philadelphia. It came up accidently and ran up two cherry trees, and the the present generation have confounded it and the Schuylkill grape together. The late Mr. Bartram, botanist, &c. gave me the account of the Schuylkill grape, and William Clifton himself gave the account of the latter.

The best wine I ever made was from the Schuylkill grape, and it was the first time I attempted it: it was pronounced by Mr. Jefferson, "worthy the bes vineyards in France." The Constantia also makes a decent wine, but neither of them has a sufficient body without the addition of some sugar.—The grape which has been sent over the country as the Madeira, is I believe, what I call the Bland Madeira: it is a pale red grape, with a purple bloom on it, and better than any of the above for the table; it is a very great bearer, and makes a good wine, but it is much more difficult to manage than any of the others, to keep it from running into the acetous fermentation.

I am of opinion that it is a native grape, from the length of the joints, and the shape of the leaves, which are exactly of the colour and form of the leaves of the white Fox-grape. There was a time when every thing a little better than common; a good pear, apple, peach, plum, cherry, grapes, &c. if a little better than the person was in the habit of seeing, was English. That prejudice still prevails in a degree; and if a native grape is found to be a little better than the common fox grape, or the small grape commonly called the chicken, there is immediately doubts of its being a native, and must be either a foreign grape or a hybrid.

"The Munier grape I presume you know; it is a French grape, and in the year 1823, I made a barrel of wine from them which all the French gentlemen who tasted of it, prodounced the best Champaign they ever drank out of France. It did not sparkle but was delicious, and I sold it readily for ten dollars the dozen bottles.—The Worthing grape is not so large as the fox-grape; it is a black grape and a very great bearer, has a very high coloured juice, with a rough and rather harsh taste; and I think will make a wine resembling Port; but I have as yet mixed it with the other wines I made. The above kinds of grape are all I have in my vineyard, that I have made wine of. (*To be continued.*)

ART. 62.—*Extracts from Loudon.—Kalendarial Records.* [For the New-York Farmer.]

Mr. Editor,—In No 2 of your present Vol. I read with pleasure, the remarks on the benefits resulting to farmers and gardeners, from the practice of recording transactions relating to tillage. I subjoin a few extracts from Loudon, which, I think, will suggest a few hints on the subject.

In his Kalendarial Index, page 1147 he gives us the following average of the Thermometer for the month of January; London, 35.9, Edinburgh 34.5, Dublin 29.92,—greatest variation from the average 6.

Kalendar of animated nature round London. Second

week, Red-breast whistles; Nuthatch chatters; Misseltoe-thrush sings; and the Wagtails appear.

Third week, the common Lark congregates. Fourt hweek the hedge Sparrow whistles, the large Titmouse sings, and Flies appear on windows.

Kalendar of vegetable nature round London. Second week, winter Aconite, Christmas Rose in Flower, and Hazel Catkins beginning to appear, also common honysuckle. Third week, Primrose flowers in sheltered situations; Daisy and Chickweed begin to flower. Fourth week, Daphne mezereon begins to flower; Viola Tricolor, Viola Odorata, and Colts-foot show blossoms.

Kitchen Garden.—Sow Peas, Beans, Lettuce, Short-top and Salmon colored Radish.

February, average of the Thermometer, London 42.3, Edinburgh 36.6, Dublin 43.78.

Kalendar of animated nature round London. In the first week, Bees come out of their hives, Gnats play about, Insects swarm under sunny hedges, Hen Chaffinches flock, and the song Thrush, and the common Lark sing. Second week, the Buntings and Linnets appear in flocks, Sheep drop their lambs, Geese begin to lay. Third week, Rooks begin to pair, and resort to their nest trees; house-Sparrows chirp and begin to build, the Chaffinch sings. Fourth week, the Partridge begins to pair, the Blackbird whistles, and the field and wood Lark sing, the Hen sits.

Kalendar of vegetable nature round London. In the first week, the Snow-drop, Whin, White Dead-nettle, and Polyanthus flowers; the Elder, and some Roses and Honysuckles begin to expand their leaves. Second week, common Crow-foot, Dandelion, and the female flowers of the Hazel appear. Third week, Veronica in flower, many of the Poplar and Willow tribe show their catkins, and also the Yew, the Tulip, Crown Imperial, and various other bulbs, boldly emerge from the ground.

Kitchen Garden.—Sow Radishes, Spinage, Lettuce, Peas, Beans, Early Cabbage, Red Cabbage, Dill, Chervil, Fennel, Early Horn Carrot, Dutch Turnip, Salads, Onions, and Leeks.

March, average of the Thermometer, London 46.4, Edinburgh 41.7, Dublin 44.9.

Kalendar of animated nature round London. In the first week, the Ring-dove coos, the white Wagtail sings, and the yellow Wagtail appears. Second week, the Jackdaw begins to come to churches, the Tomtit makes his spring note; Brown wood Owls hoot, and the small Tortoise shell Butterfly appears. Third week, the marsh Titmouse begins his notes, various flies appear, the Fox smells rank, the Turkey cock struts and gobbles. Fourth week, the Yellow-hammer, and Green Woodpecker sing, Rooks, Ravens, and house Pigeons build; the Goldfinch sings, field Crickets open their holes, and the common Flea appears.

Kalendar of vegetable nature round London. In the first week, various species of the Pine, Larch, and Fir, tribes in full flower; the Rosemarry, the Willow, and Bay, in blossom; various Trees and Shrubs beginning to open their buds. Second week the common Honysuckle, and some Roses, in leaf; Crocus vernus, and other subspecies, and some Scilla, in flower; Pilewort and creeping Crowfoot, Hepatica and Elder sometimes in leaf. Third week, Saxifraga Oppositifolia, Draba verna, Daphne pontica, and Collina, Lonicera nigra, in flower. Fourth week, the the Peach and Apricot, Nectarine, Corchyrus Japonica, Pyrus Japonica, Crown Imperial, Saxifraga Crassifolia, Buxus sempervirens, and other plants in warm situations in flower, or advancing to that state.

Kitchen Garden.—Sow the main crops of most esculents. Drumheaded and Scotch cabbages for field culture, Peas, Beans, Lettuce, Spinnage, Savoys, small Salads, Onions, Cauliflowers, Turnips, &c.

April 1829. A GARDENER.

ART. 63.—*Agriculture in England.*

An American gentleman now in England, writes thus to the Editor of the American Farmer.

Nothing that I have seen in England has so highly delighted me as the improved state of her agriculture. My ardent love of the beauties which God has so liberally dealt out to that portion of the earth which lies without the "smoke of cities," has perhaps led me into the belief that in nothing is she so worthy of admiration as in the labour and money bestowed upon the reclaimation of her wastes, bogs and morasses, and the taste displayed in the adaption of every spot to its proper and legitimate purpose. I say nothing of the splendid seats of the nobility and gentry, they are but "circumstances in her condition," it is the general appearance of the country, ride in whatever direction you will from the metropolis, that excites my admiration and wonder.

The prominent circumstances that strike the eye of an observant American travelling in England, are the deep verdure of her fields at all periods of the year, the almost total want of woods of every description, the minute division of the fields by means of live hedges, and the startling superiority of English stock of *every* kind, over that of the United States, The deep verdure is the effect of that peculiar moistness of the climate which I am patriotic enough to think places England below my own dear America, as it regards natural advantages. If you have not been in England, really you can form no idea of the intolerable vexaton attending continual showers, or the continual apprehension of them. Your umbrella is as necessary a

part of your dress as your hat, and quite as common. Mud and rain, rain and mud, and a hackney coach belong to the every-hour look of a resident in England who exposes himself to the weather; trees, of all descriptions, fences, buildings, have all the same verdure— that is, they are all covered from the excessive humidity of the climate, with a kind of ooze, resembling that found in our rivers. There is so much moisture that it is impossible to cultivate the earth on a smooth surface. Hence the perpetual recurrence of ridges and drains, the former wider or narrower, the latter deeper or shallower, as the situation of the land its elevation or depression may require, The labor and expence attending this process cannot be estimated by those unacquainted with it. If it were necessary in the United States, with the present high price of labour and the low price of produce, it would be a bar to the cultivation of the earth. Happily it is not, and my observation of the soil and climate where the practice obtains, leads me to join heartily with your judicious friend Mr. Powel of Philadelphia, (who has, by the by, more practical good sense than half the agricultural writers of our country,) that in our climate, cultivation should take place on a level surface always, the object being to retain moisture instead of excluding, or evaporating it. If I live to resume the happy business of a farmer, I shall give up ploughing among corn from a conviction that it is injurious.

Your enthusiastic friend, Mr. Kirk of Delaware, so passionate an admirer of live hedges would be much gratified in travelling through England. Except now and then park pailings, and brick walls, and *sparsim* a few, very few fields, he could see nothing else. But the reason of its being adopted here does not hold good in the United States, nor will it ever, if due care be now used to plant chesnuts and cedars. It is here adopted of necessity, stern unyielding necessity, there is nothing else to divide the fields with. But when you witness the time and protection necessary until they become *fence*, which is not much less than ten years, the space of land they take up, with the greatest care in narrowing the ditches on each side, not less than 12 feet, and after all the severity of the laws respecting stock running at large, and the plenty of grass growing in every field, conspire to render stock better taken care of, and less restless than in America, I am persuaded it will never become the fence of our country. A writer in the American Farmer recommends plantations of trees adapted to fencing with a view to future wants, that is, that calculating the period of decay of a fence of chesnut rails, and locust or cedar posts, at twenty years, a plantation be formed at the time a new fence is put up to supply the delapidations of time. This is an excellent idea, and should be used by the American husbandman.

In the beauty and excellence of our stock, we are half a century behind the English. The blood, bone, and muscle of the horses, not less of that portion of them reared for, and devoted to agriculture, than of those beautiful creatures one sees at Tattersall's, or, on fine days, in Regents park, cannot be sufficiently admired. I am no admirer of the Lancashire large breed of horses; indeed, my taste has always been for "neat bits," to use a cockneyism, carricatured in the windows of the Strand print shops. I cannot see why smaller boned dray horses would not answer as well as those elephant like animals now employed about the London and Liverpool docks. They say not, and I am contented.

I had no idea of English sheep till I came to England; their size, beauty fleece, and tendency to fatten, place them beyond any thing we have in America. I think with Mr. Featherstonhaugh, that this is to be altogether attributed to the *turnip* husbandry. Large fields of that vegetable are found on every farm where the raising of sheep is made a business. The display of fat sheep at Smithfield, offers one an inducement to thread the crooked and dirty streets which lead to it. While on this subject, I must remark that the low price of mutton in America discourages the sheep grower from attempting to improve his flock. At Boston, I have seen medium mutton sold at two and a half cents per pound per carcase; here mutton is selling at eleven and a half cents per pound at Smithfield, and retailing at from that price to fifteen cents. But I weary you.

Yours, truly, J. A. J.

NEW YORK, APRIL 30, 1829.

QUERIES.—*Descent of Sap* or *Cambium*. Mr. Editor,—Would Ice, cold Clay, &c. put at the root trees while they are in flower, promote fructification? If some of your correspondents would answer this query, they would oblige, A HALF PHILIOLOGIST.

[The following inquiry has been lying on our table some time. We are induced to give it an insertion from the fact that the gentleman who drew up the report of the committee, on a recent public occasion advanced sentiments which appeared to us diametrically opposite, Opinions coming from the New York Horticultural Society, composed as it is, of so many practical men, should have weight and influence throughout the country.]

The Vine.—MR. EDITOR,—I would wish to inquire of the Inspecting Committee of the New-York Horticultural Society, for 1828, in whose gardens grew those "different kinds of *foreign* grapes which have produced fruit in *perfect maturity* and great luxuriance in the open grounds of our city and vicinity."—and if there have been facts before the committee for a

"*well grounded* hope" that foreign vines will succeed in the climate of the Middle States, to make the grape a profitable source of tillage?

One of the Founders of the Society.

Annals of Agriculture in Cuba.—In page 50 and 51 of our first Vol. a work was announced from Havanna in Cuba, under the title of Annals of Science, Agriculture, Commerce, and the Arts. From its commencement, it has been regularly continued in monthly numbers until the present time; that is to say, that for the month of Febr. 1829, which is the 20th. in the series, has come to hand. It will be remembered that this work, besides the approbation of the King, is published under the protection of the Intendency at Havanna. Its object is to exhibit a general survey of the principal modern discoveries in all the branches, the principles governing them, and the relations they bear to the present and future industry of Cuba. The Editor is D. Ramon de la Sagra, the superintendant of the botanical garden near the city; who, besides the distinguished place he occupies, is well known as the author of several valuable works. One of these is a memoir on Cuban industry and resources, which he has dedicated to the Horticultural Society of New-York. The latter eight numbers belong to the second Vol. They contain a good summary of information derived partly from local sources and partly from other Journals and Publications. The Editor not unfrequently travels into the fields of medicine and political economy. In the November number there are memoirs on the cultivation of Guatimala Indigo in the Garden, and of Coffee in Brazil. That for December contains a plan of the garden, exhibiting the manner in which the ground is laid out for improvement. In the January number is an extensive and detailed account of the meteorological observations made there. That of February has a balance table of the commerce of the Island, with other parts of the world, such as our United States, France, England, Hanseatic Towns, Italy, Russia, Netherlands, Portugal, Sweden, and Denmark.

This periodical appears to be highly respectable, and well conducted,

Among the corresponding members of the Botanic Garden, we notice our distinguished citizen Samuel L. Mitchill.

Biography.—*The Hon. Ezekial Webster* while addressing a Jury on the 10th instant, at Concord N. H. with every appearance of health, fell deprived of sensation and life. The New Hampshire Statesman, has given a sketch of Mr Webster's life, from which we extract the following paragraph.

"He was a practical and skilful farmer. Living in the country—enthusiastically attached to the healthful and virtuous pursuits of rural life, and the quiet and happiness, and simplicity, of domestic scenes—He was strongly inclined to be concerned in and to cherish that great interest, which was the principal concern of his neighbours, the cultivation of the soil. He was the most active founder, a very efficient member, and subsequently the President of the Merrimack Agricultural Society—the associates of which will deeply feel and lament his loss. By exciting attention in his vicinity, to improvements in the breed of animals, in fruits, grasses, grains, and the various valuable productions of the earth, and by examples of better modes of husbandry, in draining, reclaiming, and other agricultural processes, Mr. Webster sought to be useful, without regarding the expence to himself of what he foresaw to be ultimately serviceable to the farmer and to the community. His own farm, inherited from his father, became, under his care, one of the most improved and best cultivated, as it is one of the most pleasantly situated and valuable, in this country."

Indian Rubber useful in Pruning and Grafting.—The following fact discovered by me, may not, perhaps, be useless to agriculture. Last year I cut off a native grape vine, which had been set out four years, and was vigorous, in several places, on the first ascending of the sap, about the first of May. I bound the cut ends over with thin stripes of Indian Rubber, and in every case prevented any escape of sap. I immagine this substance to be preferable to any other for binding in buds for grafting, &c. *N. E. Far.*

Improvement in the culture of Gooseberries in England.—One of the most surprising subjects in modern gardening is the improvement which has taken place in fruit during the last fifty years, especially in that of the gooseberry. By consulting the gooseberry-growers and their records, I find that the heaviest berries at the commencement of the above period seldom exceeded 10 dwts. It was about that time that people began to cultivate the gooseberry in this neighborhood, being stimulated thereto either by a spirit of emulation, or the value of the prizes.

The perfection of gooseberry fruit owes nothing to men of scientific knowledge, being cultivated scarcely by any but the lowest and most illiterate part of society, at least in this neighborhood; but, by continued experience, and perseverence in growing and raising new sorts, they have brought the fruit from 10 to upwards of 30 dwts., and that, too, under the greatest disadvantages, not having the privilege of soil, manure, situation, &c. like the gardeners of their more wealthy neighbors, but oftentimes limited to a few yards of land, either shaded by trees, confined by buildings, or exposed to the most unfavorable winds, and so barren that they have frequently to carry on their shoulders a considerable way the soil in which

the plants are to be set; yet so resolute are they in overcoming every obstacle, and so successfully ingenious in assisting nature inher efforts, that they are enabled to produce fruit surprisingly large.—*Lou.*

Loss of Sheep in Nantucket.—The Nantucket Inquirer gives it as the opinion of many that the severity of the past winter, had caused the death of one fourth part of the sheep owned upon that island; and that those which perished during and since the storm of the 22nd of March, exceeded in number all that had died in the course of the winter. And adds, "we have been informed by a gentleman of strict veracity, and who was an eye witness to the distressing spectacle, that many of the sheep where driven by the tremendous force of the storm to the southern part of the island, and there remained buried in large numbers in the snow, many of them with their heads out, and the crows actually pecking their eyes out before they were dead!"—*N. E. Farmer.*

Extraordinary Growth.—An elm tree nearly opposite the house of Heman Day, Esq. in West Springfield, was planted by him on the 8th of January, 1775, —54 years ago. At the time of transplanting, it was a sapling carried in the hand. The trunk is now 18 feet in diameter, to the height of 12 feet above the surface of the ground, where it divides into branches, which overhang a circle of more than 300 feet in circumference, covering 7,500 square feet of surface.—*Con. Mir.*

Nut Trees.—It seems astonishing that two such valuable fruit trees are so little cultivated as the *Spanish Chesnut* and the *Madeira Nut*, or English Walnut. The former produces very large fruit of excellent quality, in the greatest abundance, and in the South of France, Spain, Portugal, and Italy, it forms a most valuable article of food for the poorer classes, and is a regular article of sale for that purpose. It is but seldom this fruit finds its way to our markets from Europe, but a plentiful supply might easily be furnished by planting orchards of this tree, the same as we do with the apple—or by planting them along avenues and highways, and there is no doubt they would as well repay the proprietor asan orchard of any other kind.

The Madeira nut may be planted in the same manner, and would yield also an ample remuneration, as the nuts are sold, when green, for a dollar the hundred, for pickling; and when ripe, are in great request for the table.—*N. E. Far.*

Medicinal plants from Brazil.—On the 13th March 1829, Benjamin R. Leach of Salem Massachusetts, left with me two vegetable specimens of a medicinal kind *Chiococca-root, and Gum Kino*, from Brazil.

Cainca, Rais Preta, Cipo Cruzadinho, is the root of the *Chiococca anguisfurga.* It is known far and near for its specific virtues against Serpents' bites. It is distinguished by laxative powers, and possesses in an eminent degree all the properties of the renowned sorbents of Darwin. I am in the custom to apply it in every case of Hydropical swellings, old ulcers on the legs, venereal and scrophulous complaints, and chronical diseases of the glandular system. It is an excellent remedy. I give at once an ounce in decoction. The ordinary price of the dry root was, nay even is, in Rio, 16 dollars per aira; but the European price, I suppose, is not yet fixed on a merchantile scale. According to the assertions of Mr. Langsdorff, it is sold in London, as a *miraculous* remedy at an extremely high price; and soon after a general introduction into European materia medica, it ought to enter into commerce like China (bark,) Jalappa, Ipecacuanna, Sarsaparilla, and other drugs.

S L. M.

Annals of the Horticultural Institute of Fromont, (near Paris,) under the direction of the Chevalier Soulange Bodin.—This institute is established in that celebrated garden, in the view of promoting by competent theory and practice, the studies required in all branches of horticulture, and to instruct skilful culturists, an order of men truly useful to society, to their families, and to themselves.

This institute will therefore embrace the study and knowledge of all plants which can be raised in nurseries; also their mode of propagation, their use to our wants, and pleasures; under the distribution of three courses of lectures.

1. A course or class on Vegetable Phisiology, as applicable to Horticulture.

2. A course or class on the Cultivation of Fruit Trees, Culinary Vegetables, Forest Trees and Shrubs, whether indigenous or exotic.

3. A course or class on the art of Gardening, of Pleasure Grounds and Landscapes.

4. A School of Design, Drawing, for the composition of the Picturesque, and the study of Flowers.

In assistance to the theoretical Studies, there will be in the garden of Fromont, a Library of Botany and of Horticulture; also a collection of Agricultural Instruments, Aparatus for experiments, and a Herbal for demonstration of Plants, &c.

The different branches of instruction at Fromont, will, in fine, be illustrated by a monthly publication, with the title of *Annals*, under the three divisions of Horticulture Special; Horticulture General; and of Botanical Culturist.

The price will be Nine francs per annum. Communications addressed to M. Soulange Bodin, No. 44 St. Ann Street, Paris. F. P.

Age of Seed.—Kept from the open air and from damp, the seeds of vegetables will keep sound and good for sowing for the number of years stated in the following list; to which the reader will particularly

attend. Some of the seeds in this list will keep some times, a year longer, if very well saved and very well preserved and especially if closely kept from exposure to the open air. But to lose a crop from unsoundness of seed is a sad thing, and it is indeed, negligence wholly inexcusable to sow seed of the soundness of which we are not certain.

Artichoke, 3 years; asparagus 4; balm 2; basil 2; bean 1: bean (kidney) 1; beet 10; borage 4; brocoli 4; burnet 6; cabbage 4; calabash 7; calc 4; calc (sea) 3, camomile 2; capsicum 2; caraway 4; carrot 1; cauliflower 4; celery 10; cheryil 6; cives 3; corn 3; corn-salad 2; coriander 3; cress 2; cucumber 10; dandelion 10; dock 1; endive 4; fennel 5; garlic 3; gourd 10; hop 2; horse-radish 4; hyssop 6; jerusalem artichoke 3; lavender 2; leek 2; lettuce 3; mangle wurzel 10; marjorum 4; marigold 3; melon 10; mint 4; mustard 4; nasturtium 2; onion 2; parsley 6; parsnip 1; pea 1; pennyroyal 2; potatoe 3; pumpkin 10; purslane 2; radish 2; rampion 2; rape 4; rhubarb 1; rosemary 3; rue 3; rutabaga 4; salsify 2; samphire 3; savory 2; scorzenera 2; shalot 4; skirret 4; sorrel 7; spinach 4; squash 10; tansy 3; tarragone 4; thyme 2; tomatum 2; turnip 4; wormwood 2.

Cobbett's Gar.

Oyster shells in the Southern States.—There are also vast quantities of shells, and especially of a gigantic oyster, in many parts of the southern states. They are found, not only in digging for wells, but they form vast beds in various places.

One of the largest beds on the eastern continent, is near Tours, in France; it is twenty seven miles long and twenty feet thick.

But the beds of the southern states far exceed this. A stratum, on the whole continuous, although mixed, more or less, with the general diluvium, and other materials of the country, has been traced from the Eutaw springs, in South Carolina, to the Chickasaw county; six hundred miles in length, by ten, or from that to one hundred, in breadth.

There can be little doubt that many of the beds of oyster shells which have been attributed to the aboriginal Indians of this country are diluvial deposits.—*Sillimans Geol.*

Use of the Roller on Grass Lands.—In no branch of husbandry is the roller more an implement of utility than in the cultivation of grass. It renders the soil compact and solid; it encouragas the growth of the plants, by bringing the earth close to every part of the root; it assists in filling up and levelling any inequalities in the surface of the field, thereby preventing surface water from remaining stagnant, and eradicating the grass from particular spots; and it tends to hinder the drought from penetrating, which is an effect of the greatest importance. In fact, a grass field cannot be too often rolled; and it is not going too far to assert, that the application of the roller in Autumn to prepare the roots for resisting the winter frosts, and in Spring to firm them after those frosts, every year while the field remains in grass will amply repay the expense.—*Trans. of Highland Society.*

Enriching Properties of Water.—Water, even in the purest state in which it can be found, is an enricher, Spring water uniformly produces the earliest bite, and calcarious springs the best grass. Water in which flax has been steeped, and which the farmer is often puzzled to get rid of, without polluting the streams in his neighbourhood, forms a superior substance for irrigating; but in short, the more abundantly water is impregnated, either from running through a tract of rich soil, or from receiving the refuse of towns and manufactories, or even from being exposed to mixture with putrid substances (and so becoming putrid itself,) in ponds or in reservoirs, so much the more are its effects beneficial; and it has been frequently remarked, that no watering is so enriching as that which is given in summer floods.—*Ib.*

Florida Indigo.—It is proposed to revive the cultivation of Indigo in Florida. Formerly much Indigo was produced there, and which was only rivalled by that of the Carraccas. In former times, nearly one hundred and eighty thousand dollars were paid in London, in one year, for Florida Indigo.

Average Price of Vegetables sold at Washington Market, for April 1829. [Corrected by WILLIAM CURR, Gardener. For the N. Y. Farmer.]

Head-salad, from 18 to 37 1-2 cents per doz.—*Red Cabbage*, from 75 cents to $1 a doz.—*Head ditto*, ditto ditto.—*Brussels Sprouts*. 50 cents per bushel.—*Cabbage Sprouts*, from 50 to 62 1-2 cents a bushel.—*Spinach*, from 25 to 37 1-2 cents a bushel.—*Cresses*, 50 cents a half peck.—*Chives*, 10 cents a dozen bunches.—*Cornsalad*, 12 1-2 a 1-2 peck.—*Parsley*, 3 cents a bunch.—*Cut Salad*, from 25 to 37 1-2 cents per half peck.—*Small Winter Salad*, 12 1-2 cents a half peck.—*Leeks and Parsley*, 12 1-2 cents a bunch.—*Shallots*, 6 cents a bunch.—*Celery (blanched,)* 12 1-2 cents per bunch.—*Ditto (not blanched,)* from 3 to 6 cents per bunch.—*Radishes*, from 3 to 4 cents per bunch.—*Asparagus*, from 37 1-2 to 18 cents a bunch of from 60 to75 shoots.—*Parsnips*, from 75 cents to $1 per hundred.—*Beets*, from $1 to 1 25 per huudred.—*Carrots*, from 50 to 75 cents per hundred.—*Salsify*, 6 cents a bunch.—*Onions*, from 75 cents to $1 25 per bushel.—*Potatoes*, at from 62 1-2 cents to 1 dollar per bushel.—*Turnips*, 37 1-2 to 50 cents a bushel.

The supply of most of the above articles have been abundant and of good quality.